JUNE, 1952

The Review of Gastroenterology

OFFICIAL PUBLICATION

NATIONAL GASTROENTEROLOGICAL ASSOCIATION

SYMPOSIUM ON CARCINOMA

The Indications for Conservative Rectal Resection

Radiology in Cancer of the Digestive Tract

•

Seventeenth Annual Convention

New York, N. Y., 20, 21, 22 October 1952

VOLUME 19 NUMBER 6

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AUTHORS	No. of Patients	Chronic, Resistant to Other Therapy	TYPES OF ULCERS				RELIEF OF SYMPTOMS (Chiefly Pain)				Surgery or Complications[1]	Side Effects Requiring Discontinuance of Drug[2]	EVIDENCE OF HEALING			
			Duodenal	Jejunal	Stomal	Gastric	Good	Fair	Poor	No Report			Complete	Moderate	None	No Report
Grimson, Lyons, Reeves	100	100	93	7			80	11	4		5		47		19	29
Friedman	15	15	14			1	5		4	6[3]			2			13
Bechgaard, Nielson, Bang, Gruelund, Tobiassen	26	26	21			5	16	4	6				8	6	12	
McHardy, Browne, Edwards, Marek, Ward	162		162				136	12	11		3	1	14	9	7	129
Segal, Friedman, Watson	34	34	34[4]				14	13			7	2	5		8	14
Brown, Collins	117	99	117				97	7	8		5	8	55	9	8	40
Asher	77		65		7	5	52	9	16			16		9	21	47
Rodriguez de la Vega, Reyes Diaz	5	4	5				4		1					3	2	
Winkelstein	116	116	102	8		6	102		14				53		18	45
Hall, Hornsber, Weeks	18	18	18				11		1	6[5]			18			
Maier, Meili	38	38	24			14[6]	27	7	4[7]				10	2	5	21
Meyer, Jarman	25	18	25				21		4							25
Poth, Fromm	37	37	37				33	3	1				33	3	1	
Plummer, Burke, Williams	41	41	41				36		5				38		3	
McDonough, O'Neil	104	100	104				63	10	31			11	4		11	89
Broders	60	60	58		1	1	35	19	6				10	1	49[8]	
Legerton, Textor, Ruffin	11		11				11									11
Holmbeck, Hollmbeck, Langford	76	69	76				35	27	10		4	10	26		10	36
Ogborn	42		39	2		1	42[9]									42
Shoiken	48	48	48				33	10	3		2		33	10	3	
Johnston	145	145	145				143		2			2	143		2	
Rossett, Knox, Stephenson	146		141			5	146					4[10]	53			93
TOTALS	1443	968	1380	17	8	38	1142	132	131	12	26	54	552	53	179	634
PERCENTAGES		67.8	95.6	1.2	0.6	2.6	81.3	9.4	9.3			3.7	70.5	6.6	22.9	

1. Not included in tabulations.
2. Included in "Relief of Symptoms" as "Poor" and in "Evidence of Healing" as "None."
3. Four had no symptoms when Banthine therapy was begun.
4. Of which seven were penetrative lesions and five partially obstructive.
5. No symptoms were present in four.
6. Two with symptoms only; no demonstrable ulcer.
7. Three were psychopathic patients and one had a ventricular ulcer of the lesser curvature.
8. Roentgen findings after treatment period of two weeks; forty-seven had duodenal deformity.
9. All returned to work within a week.
10. In these four, after relief of symptoms, Banthine was discontinued because of urinary retention.

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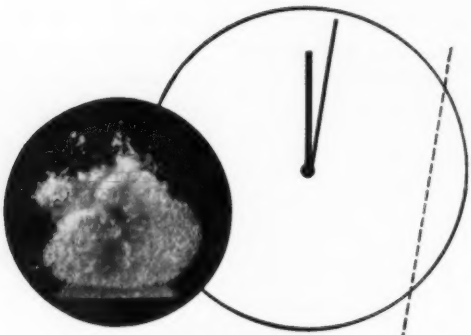

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The Pioneer Journal of Gastroenterology, Proctology and Allied Subjects in the United States and Canada

VOLUME 19 JUNE, 1952 NUMBER 6

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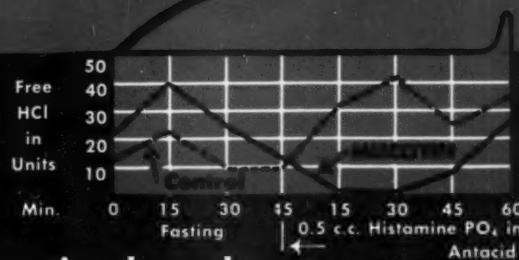

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1. Cass, L. J., and Wolf, L. P.: Gastroenterology *20*:149 (Jan.), 1952.
2. Berberian, D. A., Pauly, R. J., and Tainter, M. L.: Gastroenterology *20*:143 (Jan.), 1952.

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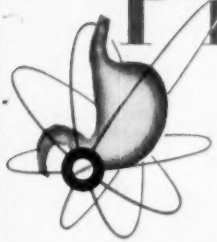

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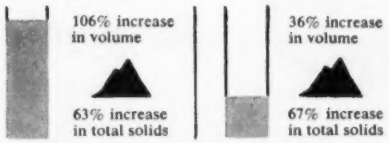

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SYMPOSIUM ON CARCINOMA

THE INDICATIONS FOR CONSERVATIVE RECTAL RESECTION*

GEORGE T. PACK, M.D.

New York, N. Y.

The subject might well have been entitled "Contraindications for the Preservation of the Rectal Sphincter in the Treatment of Tumors of the Rectum". It would seem paradoxical for a surgeon such as myself to consider conservative procedures for the preservation of the rectal sphincter in this late day of radical surgery, during which there is a national contest among various surgical groups and clinics as to how much of the human body may be removed with preservation of a human residue that will survive and function.

As one of the guilty parties in extending the scope of radical surgery in the treatment of cancer, it would seem a backward step for me to admit that in certain cancers of the rectum it is still feasible to preserve the sphincter. Some of our colleagues are so bitterly opposed to conservatism under these circumstances, that the mere histological proof of cancer of the rectum is in itself the one contraindication for the preservation of the rectum, even though they employ sphincter preservation for benign lesions such as megacolon and occasionally colitis.

Great pressure is brought to bear on all of us who are doing surgery of the large bowel to preserve the sphincter. The surgeon who does this in a few cases finds himself then importuned by the family doctor, and even more so by the laymen who hear that it is possible. The temptation under these circumstances becomes quite great because patients who have cancer of the rectum will flock to him in the hope that he may offer them a preserved rectal sphincter, after a more logical and radical surgeon may have told them that it was necessary to sacrifice it. Our experience and our conscience must be our guides in such a crisis rather than sentiment or a desire to please the patient.

Many surgeons who have done this operation in the past have in later years found themselves faced with the unpleasant situation of discovering that in their

*Read before the Sixteenth Annual Convention of the National Gastroenterological Association, Chicago, Ill., 17, 18, 19 September 1951.

application of the operation they have extended the indications to such an extent that recurrences have been common, morbidity increased and the curability greatly lessened. In our enthusiasm for the employment of the conservative operation we must take care that we don't attempt to suit the patient to the operation rather than the operation to the patient.

I am not here, really, to defend or advance the cause of conservation of the rectal sphincter. The radical operations for cancer of the rectum are established and are to be used in the great majority of cases. Every surgeon should approach the patient having cancer of the rectum with the plan of performing the classical resection, modified as it is now by a much more radical removal of a larger segment of bowel, of the greater portion of the omentum, of the mesentery, and, of course, associated with a dissection of the pelvic lymph nodes. It is the surgeon who should be happily surprised, even more so, or as much as the patient, to find that a particular situation as regards the cancer might lend itself to conservation of the rectal sphincter. It is unwise for any doctor, in discussing with a patient the operation to be done, to promise in advance that the sphincter can be and will be conserved. He should not be handicapped in any way so that at the time of the laparotomy he may be free to do the operation of his choice which he considers best suited for the individual.

In selecting the operation for the individual patient, one must consider first the condition of the subject; secondly, the location of the cancer within the rectum; thirdly, the stage of the disease; fourthly, the degree of malignancy; and finally, the experience of the surgeon in dealing with a problem of this character.

In various articles which have been published on preservation of the rectal sphincter, the statement has uniformly been made that the operation should be done only for those patients who have a prospective cure; this remark is usually accompanied by a sentence or paragraph stating that it should not be used for any patient who has an incurable rectal cancer as for instance, in the case of metastases to the liver. This is truly backward thinking, because the greatest indication for conservation of the rectal sphincter is in the incurable case. Here we are committed to the point of view of palliation. If a patient is subjected to laparotomy for cancer of the rectum with the intent of doing the classical abdominoperineal resection and some metastases are found in the liver, and the patient does not have greatly impaired liver function so that predictable life expectancy might make it worth while to resect the cancer, almost every surgeon is committed to resecting the rectum, colon, or stomach if it is technically easy to do, without great hazard to the patient, even though a cure is not possible. It is part of our function as physicians to treat the cancer where we find it.

The time necessary to remove these incurable cancers of the gastrointestinal tract, consuming two or three hours of the surgeon's day is indeed a very good exchange if it will give the patient six months or a year of postoperative comfortable living. A witness to the suffering of individuals from the progressive growth

of residual rectal cancer in patients for whom a simple colostomy was done, but for whom a resection could have been easily performed in the presence of liver metastases, will conclude that a better palliative result could have been achieved if the cancer of the rectum had been removed.

Rectal resection in the presence of small hepatic metastases is an operation designed for palliation and by "palliation" we do not mean that the patient will live longer and suffer more. The definition of palliation is not simply the duration of life, but rather the measure of comfortable living that the individual enjoys in the remainder of his life. It is our own contention that he will live more comfortably if he has the primary cancer removed. This decision requires a nicety of judgment, because if the operation is attended by a high operative mortality or requires the removal of many organs with a high morbidity, then the operation is abandoned — at least it would be by me.

Since we have defined "palliation", and decreed that resection should be done, herein lies the ideal circumstance to preserve the rectal sphincter. We are not concerned so much this time about late recurrences in the pelvis, because we know there are proved metastases in the liver which will ultimately result in the death of the patient. So it is that if the rectal cancer does not encroach upon the sphincter, and there is adequate space above the sphincter to enable one to carry out the resection and perform a very low anastomosis, or do one of the various pull-through operative procedures in which the sigmoid colon can be brought down and even intussuscepted through the anal canal and attached, here is a good indication for the sphincter-saving operation. Metastasis to regional nodes is not a barrier because these nodes are removed with the colo-rectal specimen. Why concern ourselves about the hazard of local recurrence in the pelvis under these circumstances, when the patient already has metastases to the liver?

A case in point is that of a nineteen-year-old girl, a modest, retiring individual, with perhaps an inferiority complex, who developed a cancer of the rectum. She was shy and said very little or nothing about the rectal bleeding until the cancer was quite advanced and incurable. At the time of laparotomy she had metastases to the liver and ovaries. A resection was done which included the removal of the lower pelvic colon, the uterus, the involved ovaries, and the rectum except for the sphincter; a low anastomosis between the colon and the anus was accomplished on this girl. We were compelled to take out part of the posterior vaginal wall. This little single girl lived comfortably for more than a year after the operation and was able to have bowel movements by rectum. Being familiar with her temperament I am sure that if we had burdened her with a colostomy for the rest of her comparatively short life, it would have been a tragedy because it would have added to her feeling of inferiority.

If the rectal cancer can be removed and the sphincter muscle preserved in these incurable cases, then a greater measure of palliation will be secured because

these people, when they have such a definitely abbreviated life expectancy need not spend their days uncomfortably in becoming adjusted to a colostomy. This thesis has not been supported or advanced by surgeons doing resections of the colon and rectum. I advocate it from my point of view, as the chief indication for the operation rather than for the patients who have prospects of cure.

Some consideration must also be given to other features about the specific cancer in the particular individual, bearing in mind the manner and routes of metastases. It is true that cancers of the rectum do not have as great tendency to invade and infiltrate the wall for a considerable distance as cancer in other organs. Having been surgically educated primarily in gastric cancer surgery, with colonic and rectal surgery of secondary and later interest, I have been constantly aware of the great hazards of performing resections of the stomach too close to the site of the primary cancer. Cancers of the esophagus too are notoriously prone to spread submucosally and intramurally to very high and distant levels, so that I am forced to believe perhaps that nothing short of total esophagectomy should be done for a patient with esophageal cancer.

Because of this apprehension as applied to excision of rectal cancer I cannot view with equanimity the conservative principles that some surgeons have accepted based on the assertions of pathologists who have claimed that 95 or even 98 per cent of rectal cancers will seldom infiltrate to a distance greater than one to one-and-a-half inches beyond the palpable margins of the tumor. Surgeons have unwisely been encouraged to perform these resections at a relatively short distance from the palpable margin of the cancer. It is true that following such conservative operations local recurrences involving the mucosa or intramural pathways have not been so great as recurrences developing outside of the rectal wall itself; nevertheless, I have not been willing to carry out the resections distal and proximal to the cancer at such short distances as has been advocated from many sources.

A second method of metastasis is when the cancer of the rectum goes by the blood vascular route. Statistical data vary for proof of blood-borne metastases. Certainly the incidence of blood-borne invasions as shown on microscopical study is directly proportional to the scrutiny of the pathologist. The pathologist who makes many more sections of these specimens and studies them carefully, will find microscopical invasion in more than 30 per cent of the cases. Even the most conservative estimate has been at least 10 per cent of the cases showing direct invasion of the blood vessel wall. Not all of these patients die from metastases to the liver, even when the microscope reveals the presence of the tumor cells in blood vessels. There are only a few that do survive. Certainly a conservative resection as applied to these patients would not modify the end results appreciably, inasmuch as the venous extension of the disease is not in the direction of the anal canal nor the rectal sphincter, which is preserved; however, the surgeon at the time of the operation has no way of knowing if the veins are invaded by the

cancer. He must await the pathologist's report. Therefore this information will not be available to him in time to permit this knowledge to influence his conclusion as to whether or not he will carry out the radical operation or preservation of the sphincter.

A word about the lymphatic dissemination of rectal cancer as it influences our choice of surgical procedures. The injection of dyes and clearing of the rectal specimen with identification of the nodes which Doctor Gilchrist of Chicago, has done so well and made such important contributions to our knowledge reveals the three different zones of lymphatics, namely the lower, middle, and superior zones. We are aware of the fact that there is little tendency for the lymphatics of the rectum to extend downward towards the anus, and in those instances in which it does, the patient usually has well-developed metastatic deposits in lymph nodes higher up, with an obstruction of these lymph nodes with lymph stasis. Under these conditions a better opportunity exists for retrograde lymphatic extension downward, but in any large series of cases, surgeons do not find any metastases spreading in a retrograde fashion, certainly not in an average run of early or operable rectal cancers. Because of this, they have been perhaps too conservative in the amount of rectal tissue that they removed below the palpable margins of the cancer, and it is true, of course, that recurrence does not develop so frequently in the distal segment.

Even small cancers in the lower rectal third can skip the intervening lymph nodes and pass directly, by way of the lymphatics, to a high level. We recently had a patient with a tiny ulcerative adenocarcinoma within the anal canal, a little larger than a centimeter in diameter, so small I even doubted the accuracy of the biopsy report, and when the specimen was opened and inspected, one could barely see where the mucosa was eroded yet there was one lymph node containing metastatic carcinoma high in the region of the sacral promontory; so this distant extension can occur and may modify our point of view concerning the conservative surgical resection of cancers of the rectum.

A word or two is necessary about, first, the location of the cancer within the rectum, and, secondly, the operative procedures commonly employed for preservation of the rectal sphincter.

Some cancers which are situated at a distance of approximately 5 inches or 12 cm. above the anal margin, if there is not gross evidence of extension to the lymph nodes, as one can tell, still may be treated by radical surgical removal with preservation of the sphincter. We never do this if the cancer is of high grade malignancy, Grade III or Grade IV, nor if the cancer is reported as a gelatinous carcinoma. Our results with gelatinous cancers of the rectum, colon, and stomach have been notoriously bad. Preservation of the rectal sphincter is not attempted if the cancers have obviously perforated through the rectal wall.

As we elaborate it is evident that more and more rectal cancers are excluded from consideration for conservative resection. The cure rate of cancer in the lower

rectal third, even by the classical abdominoperineal resection, is lower than for those which are situated in the rectosigmoid region, so we must abandon all thought of employing the conservative surgical procedure for cancers anywhere near the rectal sphincter.

I have learned through serious mistakes and improper judgment to limit this operation for cancers which are easily accessible, polypoid in character and of low grade malignancy, which are clinically, at least, not greatly invasive, and which do not attempt to circle the bowel. One may expostulate that these limitations leave a great majority of rectal cancers out of consideration for the sphincter-saving operation, and that is true.

There are some published reports from surgical clinics in which 75 per cent or more of patients with cancer of the rectum have the operation performed with preservation of the sphincter. In our own experience it is less than 10 per cent. This low figure means that we are not attempting to increase the scope of the operation. We hope to be alert enough to recognize the proper employment of this procedure for early rectal cancers when they do exist and when the conditions are ideal for the operation.

I have never used the sphincter-saving operation for an invading carcinoma that is situated below the level of the peritoneal reflection. In so doing, the surgeon is subjecting the patient to an unnecessarily great hazard of recurrence of the disease.

Of the operations currently employed there are two which lend themselves quite well and happily so, to preservation of the rectal sphincter. One is the superior segmental resection, in which the approach is made through the abdomen. One can carry out a relatively radical operation from above, with the removal of a large segment of the colon, resection of the vessels which have their source in the neighborhood of adjacent and suspected lymph nodes, and radical removal of the mesocolon to which it is attached. The dissection from above under these circumstances must be complete and down to the pelvic floor, because you cannot depend later on the perineal closure as one does in the classical Miles procedure. The bowel is transected immediately above the anus and is removed completely; then the proximal colonic segment is brought down to construct an end-to-end anastomosis. In doing this one must take care that there is sufficient blood supply to the distal and to the proximal segments: this may require mobilization of the entire left colon including the splenic flexure. If the mesocolon be short, and is resected widely with removal of the lymph nodes, the surgeon may be faced with the hazard of having the bowel too tense at the site of the anastomosis. It is freed beyond the splenic flexure, so it can be mobilized and the anastomosis completed without tension.

The selection of a pull-through procedure may be done. I have tried the Bacon and Babcock operation in which the mucosa is sectioned from the anal

canal with attempted preservation of the sphincter muscles or occasionally by the posterior section of the sphincter with a reconstruction, but I have not found this to be as successful as other modifications of the old Hochenegg operation. The patients on whom I have done this operation have not had as good control of the sphincter as Dr. Bacon has had himself. I am of the opinion that the blood supply above has been impaired somewhat. In three instances I have been compelled subsequently to perform a colostomy because of progressive necrosis of the bowel up within the pelvic cavity.

Whenever I plan a sphincter-preserving operation I manually dilate the anus, in fact overdilate it so it is temporarily paralyzed, and then with the intussusception technic one can do an anastomosis exteriorly. This anastomosis is done in two ways, one of which is by the procedure of intussusception as practiced by Swenson, Welch and others, for megacolon. The tumor in such a case must not encircle the bowel which has to be turned inside out. The patient must not have a tremendous amount of fat in the mesentery, i.e., a fatty bowel, because in this case one cannot intussuscept it. The situation must be ideal, with a small nonobstructing tumor else it will interfere with the intussusception of the bowel. When this is done, having the complete dissection of rectosigmoid and pelvic lymph nodes done through the abdominal route, the assistant places a fenestrated sponge forceps through the anus and up the colon superior to the site of the tumor; through the fenestrations heavy sutures are passed which ligate the bowel above the tumor so that it can be used for subsequent traction.

Some hospitals use a double team here in which the other pair of surgeons excises through the perineum and does the intussusception under the guidance of the surgeon doing the operation within the pelvic cavity. I have done this procedure but have not found it to be necessary. One usually proceeds with peritonization of the pelvic floor and closing the wound without colostomy.

It is dramatic to see this bowel come intussuscepting out with the tumor on the mucosal surface. When that is done, one can make a circular incision around and remove the intussuscepted section of the bowel. Two layers of interrupted sutures are inserted to allow subsequent expansion of the bowel, and the anastomosis is slipped back within the dilated sphincter. One has to make the incision relatively close to the anus because if the anal segment is too long, the blood supply is compromised.

There is another procedure by which this pull-through procedure can be accomplished which is to do the entire extirpation from above, and then by means of forceps inserted through the anus grasp the proximal severed end of the bowel and pull it through, inverting it with the transected anus. This principle is reserved for patients with much fat in the mesentery or around the bowel, or who have massive tumors or who have had involved regional nodes that have been resected with the consequence that the mass of tissues is too big to permit intussusception. It finds its greatest use in our hands for incurable cancers of the

rectum. We try to remove the advanced cancers and to effect an anastomosis in the hope of giving palliation.

Occasionally we have committed errors in judgment. I have been influenced sentimentally, for instance, in performing such a conservative operation on a woman bedridden because of arthritis, only to have her develop a recurrence intramurally in the posterior vaginal wall, requiring a subsequent abdominoperineal resection. Another instance was an aged patient with extensive arteriosclerosis, whose iliac vessels were so tortuous and calcified that I should have known I couldn't depend on the integrity of the transected bowel. The proximal segment became necrotic well above the anal sphincter, so we were compelled to subsequently perform a colostomy in this case.

The incidence of fistulae from the anastomoses has not been great. Some sources have declared it to be as high as 6 per cent but this has not been true in our cases.

The operation for conservation of the rectal sphincter is attended by a higher morbidity than the straight Miles procedure. Complications do occur more frequently. One woman experienced severe thrombophlebitis of the pelvic veins but she is living and well now, more than twelve years. We aided ourselves in doing this conservative operation in this multiparous woman by incising the posterior vaginal wall, aided by episotomy which can be quite helpful in constructing the anastomosis.

I have had a number of aged patients who had tiny or small polypoid rectal lesions which were reported as showing early malignant changes. These patients usually seventy-five or even eighty years of age and otherwise disabled, would not have tolerated abdominoperineal rectal resection. Some of these small polypoid carcinomas have been removed by endotherm excision followed by gold radon seed implantation; these selective treatments have been successful, but are sometimes attended by a long period of proctitis, pain and discomfort.

There have been other instances in which I have exposed the rectum through a posterior approach after excising the coccyx. Local incisions for early small malignant tumors have been done by means of a posterior superior proctotomy.

Patients undergoing these conservative resections with preservation of the rectal sphincter should not have local recurrences if the cases were properly chosen in lieu of the radical abdominoperineal technic. If the patient develops metastasis in the liver, this is a part of the natural history of the disease over which the physician has no control inasmuch as the patient probably had invasion of the blood vessels at the time of operation.

In conclusion, the sphincter-preserving operation should be reserved for those early cancers which are situated well above the rectal sphincter and which are not invasive. A good indication for this operation exists in patients with metas-

tases to the liver in whom it is certain that a cure cannot be obtained. Conservation of the rectal sphincter under these circumstances can add quite a bit to the palliation which you are offering the patient by the resection.

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RADIOLOGY IN CANCER OF THE DIGESTIVE TRACT*

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Having been asked last night to substitute this afternoon for Dr. Fred Hodges who was detained, I accepted this opportunity to present to you the subject assigned to him – Radiology in Cancer of the Digestive Tract. I trust that my presentation will not be in the nature of an anticlimax to the members of this Society who anticipated hearing an essayist of known reputation and ability.

In trying to organize my thoughts on this subject I was somewhat at a loss as to how to cover it suitably for this group. It occurred to me, however, that it might be of interest to present a crystallization of a radiologist's thoughts on Radiology in Cancer of the Digestive Tract and then show some illustrative slides.

First I wish to enter a plea for a brief, but good clinical history. This is a most welcome help to the radiologist. Unfortunately many a patient is directed to the radiologist for a gastrointestinal study with the same abandon that he is sent to the clinical laboratory for a Wassermann test. Out of justice to the patient, the radiologist must be regarded as a medical consultant who requires clinical facts with which he must integrate the results of his examination in order to arrive at a considered opinion. The radiologist should no longer be expected to base a diagnosis upon his own objective findings alone. There must be free opportunity to discuss in detail these findings in relation to other pertinent clinical facts. This requires a certain "rapport" between the referring physician and the radiologist.

The radiologist should endeavor to be honest with himself. He should not allow himself to be swayed too much by the clinical history. The clinical history must serve as a guide to the radiologist in his fluoroscopic and radiographic procedure as well as his interpretation. He must not feel, for example, that he *must* make a definite diagnosis in a case of persistent or recurrent melena. I cite this well-known problem because of a recent case in point – namely that of a patient with persistent tarry stools and many negative radiologic examinations of the gastrointestinal tract until someone finally made a diagnosis of a duodenal ulcer. On this basis, he was subjected to a gastric resection. At surgery, no ulcer was found and no other lesion was turned to light to explain the melena.

In addition to intelligent use of the clinical history, the radiologist must train himself to utilize all the modern armamentarium at his disposal. He should not develop the idea that one phase of an examination is generally more useful

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than another. There are those who still place so much emphasis on fluoroscopy that they have neglected to develop the technic of recording their fluoroscopic findings adequately with properly exposed films of the gastrointestinal tract. An organic lesion of the gastrointestinal tract demonstrated by fluoroscopy can and should be demonstrated on films. It is not unusual, particularly in a heavy patient, for the radiologist to discover that the films do not support his fluoroscopic findings, but demonstrate lesions not seen fluoroscopically. I strongly feel, without deprecating the rightful place of fluoroscopy, that the importance of obtaining good films cannot be overemphasized. It is not safe to depend on fluoroscopic findings alone. These findings must be confirmed radiographically, and fluoroscopic observations alone should not be used to cover up poor films. You all know that in many instances you will pick up small lesions on good films and mucosal studies which you would not see on careful fluoroscopy, whereas the opposite is very rare.

In this regard, I should like to emphasize the usefulness of mucosal studies as an important part of Radiology in Cancer of the Digestive Tract. In the stomach, these are best obtained by using a small amount of barium in conjunction with "spot" radiographs and graded compression.

Even today it is not uncommon to find diagnoses based on detailed fluoroscopic reports without good concomitant film evidence, simply because the radiologist has closed his mind to the possibilities of "spot" radiography and good Bucky films made in various positions and various phases of peristalsis (that is, serialograms).

The radiologist must develop his own routine procedure in the study of the digestive tract. But he must not be rigid in regard to this. In particular, the patient's clinical history should be an important factor in his decision to alter this procedure in favor of special emphasis on one or more phases of the examination.

In spite of the exercise of the greatest care, every radiologist makes mistakes. These mistakes will be minimized if he insists on repeating the examination — several times if necessary — if the findings are at all questionable. There must never be any question, for example as to whether a filling defect in the barium-filled colon is produced by a fecal particle or a small polyp. The examination must be repeated without hesitancy when such a question arises. Often a sigmoid "polyp" in a patient with fresh blood in the stool will be proved on re-examination to have been fecal material. On the other hand, it is not unusual to find that "fecal material" in a patient without bleeding is in reality a polyp when compression films are made of the area under suspicion.

The axiom that "to make a diagnosis, one must think of it" applies as forcibly to Radiology in Cancer of the Digestive Tract as to other fields of medicine. As an example of this I should like to cite the following case.

A thin white male, aged 28, had an appendectomy 7 years ago for "recurrent appendicitis". He complained recently of sensation of pressure and soreness in the right lower abdomen. This was relieved by a bowel movement. The patient's physician palpated a small, hard, marble-sized mass in the region of the cecum and referred him for barium enema studies. These studies revealed a rounded filling defect in the head of the cecum, corresponding to the palpable mass in size, shape and position.

Spot compression films after evacuation of the enema showed a thin coat of barium on the surface of this small mass without disturbance of the neighboring mucosal pattern of the cecum. A gamut of diagnostic possibilities was considered – benign tumor such as polyp or carcinoid, lymphoma, or inverted appendiceal stump were amongst the most prominent possibilities. At surgery, a firm mass 3 cm. in diameter was palpated in the cecum. On opening the cecum a hard, wax-like mass closely adherent to the mucosa was delivered. It was yellowish brown in color and was definitely a fecolith – a diagnosis no one had considered.

The radiologist should be humble, because sooner or later, inevitably, experiences will occur to make him humble. What radiologist has not made a statement that a patient's stomach is normal, only to have the surgeon find an advanced carcinoma; and what radiologist has not proven to himself and to the referring physician that there is unquestionably a gastric neoplasm, only to have found at surgery a normal stomach? Such experiences should cause the conscientious radiologist to take stock of himself and re-evaluate his methods and approach to Radiology in Cancer of the Digestive Tract.

Discussion

Dr. Danely P. Slaughter (Chicago, Ill.):—As a surgeon I should like to say that I am perhaps more conservative about the surgery of gastric ulcer than some of my confrères. I do not feel that the presence of an ulcerating gastric lesion automatically requires gastric resection because of the possibility of cancer. It has been my experience recently to have seen four or five females with acute gastric ulcers located high in the fundus and one or two on the posterior wall near the esophagus. Such lesions are almost supposed not to occur, but when they do it is an exceedingly difficult surgical problem because of the anatomic location. If you operate immediately, as some surgeons indicate should be done, the ulcer is in a very inaccessible location. Gastric resection would necessitate almost a total gastrectomy with a very small stoma and unsatisfactory anastomosis. To my mind, if surgery is indicated excision of the ulcer and frozen section would be the treatment of choice. However, I think good clinical judgment can allow a test of medical trial rather than immediate surgery. I have not so much quarrel with lesions of the lesser curvature and fundus, and in acute silent ulcers with a single

melena I would not operate immediately as I believe some surgeons advocate. The remarks about the Papanicolaou stain in pancreatic carcinomas made me think that it has been more useful in our experience in the ampullary lesions. These do not have jaundice to anywhere near the extent that the lesions of the head of the pancreas do, because the tumors tend to slough out and excavate themselves, and there may be only temporary obstruction or sometimes none at all. The ampulla of Vater can spill cells over more easily even than pancreatic lesions can. I should like also to emphasize the remarks that the persistence of a positive Benzidene test in the stool is one of the most important observations in clinical medicine, and one of the simplest to achieve and do.

As to Doctor Pack's presentation, I can do no more than agree with him and even emphasize his remarks. I think in general the surgical philosophy of treating cancer is somewhat contrary to what we occasionally think. To my mind this philosophy should be not the big operation for the big cancer and the little operation for the little one, but the big operation for the little cancer, because that is the only one we can cure, really. I am in thorough agreement with his figures on the infrequency of indications for curative anterior resection with preservation of the sphincter. I realize that an intact sphincter is a great social asset, but it is distinctly not a fate that is worse than death if it cannot be preserved. All of us here are well aware that an individual with a colostomy, particularly in the left side, can live a perfectly normal existence, and can be entirely happy and functional. Dr. Pack discussed four phases of the indications for preservation of the sphincter. Of these, the first was the condition of the patient. Perhaps I misunderstood him. If I did not, I disagree a little bit. I don't think that a patient in poor condition is any more a candidate for preservation of the sphincter than he is for a Miles abdominoperineal operation, particularly in the hands of the occasional operator. A surgeon doing this sort of work daily or one every three days as Dr. Pack has indicated that he does, I think may find the Miles is the better operation, better for the patient than low pelvic anastomosis. The low anastomosis is actually a more difficult procedure, particularly in a deep male pelvis, and on that score the male pelvis is distinctly more difficult to get at than the female where drainage through the posterior vaginal wall can be done quite easily. These low anastomoses are not done with a serosal surface and it is sometimes exceedingly awkward to do them. The morbidity is higher, and I suspect the mortality is higher, and therefore I would not consider that a poor risk patient is a candidate for an anterior resection because of the poor risk. Of course, metastasis to the liver or metastatic disease elsewhere is the prime reason for preservation of the sphincter. There is no point in adding insult to injury in a patient who is incurable by forcing a colostomy upon such a case if it is not anatomically necessary. As to pathology, I can only agree here, too. The only ones I do that are below the peritoneal reflexion, and that is very rare, are those that are exceedingly early, low grade malignant change in a pre-existing polyp, particularly where the lesion is movable in the mucosa and not attached to the muscularis of the bowel wall.

With the proctoscope it is sometimes possible to determine mobility of the mucosa with the lesion and sometimes even with the finger it is possible to intussuscept the bowel in reverse direction and feel a fairly high lesion. Occasionally I think some of these early movable lesions are candidates for preservation of the sphincter. Dr. Pack spoke of the consideration of the location of the lesion and I think the rule of thumb in general is whether or not the tumor is above or below the peritoneal reflexion. Age is another consideration because of life expectancy. In the younger patient, where we would like to leave the individual in the prime of life functioning without a colostomy, there I think we should do the full operation. That patient has a life expectancy for which we must do everything possible to cure the cancer in any surgically potentially curable case. In the older age groups, even in a good risk patient, where we know that the ordinary attrition of age will cut down five-year survival aside from cancer, we have far more reason to consider occasionally a preservation of the sphincter. Furthermore, I think that the older individual has more difficulty in accustoming himself to learning to handle a colostomy. The older individual with somewhat calcified habits has more grinding of his gears in rearranging his existence physiologically than a younger person, and I think that is one of the considerations that we, as surgeons, have to take into account.

THE ANATOMY OF THE ALIMENTARY TRACT*†

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In the following brief discussion of the gross anatomy of the alimentary tract, three features have been selected as being of major importance: the form of the particular portion, or glandular outgrowth of, the visceral tube; relation to the serous lining of the thorax or abdomen; and pattern of the arteries by which it is supplied with blood. These aspects of morphology will be presented, based upon original studies carried out in the author's laboratory.

Esophagus:—From the cervical portion of the esophagus throughout the length of the alimentary tract to the rectum, the fundamental characteristics of vascularization are, first, a segmental arrangement of the blood-vessels of supply (frequently with anastomosis between adjacent arteries); and, second, a tendency to follow a pattern which, despite the occurrence of variations, might be regarded as an anatomic norm.

These concepts are illustrated by the scheme of arterial supply to the esophagus: although esophageal rami are derived from the inferior thyroid, the costocervical trunk of the subclavian, from the latter vessel directly, from the internal mammary, vertebral, bronchial, intercostal, inferior phrenic, hepatic, splenic, and left gastric arteries, preponderantly the supply comes from the following sources: the inferior thyroid in the neck; the bronchial and middle set of intercostals in the thorax; and the left gastric in the upper abdomen. Generally speaking, the vessels of cervical source descend, those of abdominal origin ascend, while those of thoracic source come forward (with moderate downward inclination) to the esophagus. They are matched in course by the hemorrhoidal arteries — superior, inferior and middle — which, originating, respectively, in the abdomen, perineum and pelvis, jointly supply the rectum.

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The reader is referred to illustrations in the author's *Atlas of Human Anatomy* (Saunders, Phila., 1950), on the following pages: 225-227 (esophagus); 289-293, 303-307 (biliary ducts and associated blood-vessels); 296 (duodenum); 308-310 (pancreas); 311-312 (jejuno-ileum); 298-301, 315 (cecum, vermiform process); 313-314, 326, 328, 347-350 (colon). Therein prefatory acknowledgment is made to the author's colleagues in research and to those journal articles, published in collaboration, which are pertinent to the subject matter of the present discussion of the anatomy of the alimentary tract.

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In the intermediate part of the alimentary tract, that is, from the stomach to the sigmoid colon, complication is introduced by three factors: the embryonic torsion and rotation of the digestive tube whose length is far greater than the height of the containing abdominal cavity; secondary fixation of portions of the tube to the dorsal body wall with consequent obliteration of segments of the primordial mesenteric support; and development of the liver and pancreas, which, in being evaginated from the primitive gut, carry with them vascular rami from the celiac and superior mesenteric arteries.

Liver and biliary tract:—Perhaps in no area of equally small dimensions are anatomic interrelationships more complex than in that of the hepatic pedicle. In this limited territory the celiac artery typically divides in triradiate manner to send a branch toward the lesser curvature of the stomach, one toward the spleen, and a third toward the liver. These vessels, together with their branches to the diaphragm, esophagus, pancreas, duodenum and gallbladder, produce a pattern of great intricacy. This schema is rendered even more involved by the existence of arterial variations, by variation in the manner of confluence of the hepatic and cystic ducts, and by irregularity in relationship of the several structures enumerated to the inferior vena cava.

Most frequently a single hepatic artery, arising from the celiac, divides at the hepatic porta to send branches to the right and left lobes of the liver; hepatic and cystic ducts join to form the common bile duct; the inferior vena cava lies dorsal to these several constituents of the hepatic pedicle; and the cystic artery arises from the right division of the hepatic.

Variations are common; any one of them may occur alone in a given specimen; or aberrancy may affect the arterial, venous and biliary patterns in the same body. For example, not uncommonly two large hepatic arteries are present, the left being a derivative of the left gastric, the latter vessel sometimes constituting an element in an arcade to which the accessory hepatic contributes. Rarely the extrahepatic artery to the left lobe takes origin from the celiac directly; in such cases, the right lobe may be supplied by an upward-directed branch of the superior mesenteric. With like rarity, the inferior vena cava is anteriorly situated, passing in front of the hepatic artery. Accessory cystic ducts are sometimes encountered. Accessory cystic arteries are likewise uncommon.

Although early division of a source vessel into its branches is the most common of all arterial variations, extraparenchymal splitting of the hepatic artery into many portions is a variation seldom encountered. The arrangement, however, has been observed – as many as four branches leaving an arciform hepatic artery, the latter then continuing in looping course to become the cystic.

As already stated, accessory hepatic arteries represent a familiar type of hepatic variant. Such additional vessels may arise from a source as distant as the superior mesanteric artery. Occasionally an arrangement obtains whereby gastric and splenic arteries and an accessory hepatic branch to the left lobe all

arise from the celiac, the mesenteric then caring for the right lobe of the liver, the duodenum and pancreas, in addition to furnishing the customary intestinal rami to the jejunoileum.

These observations on "anomalous" branching of the celiac artery and its three divisions, and those having to do with the derivation of hepatic arteries from the superior mesenteric, would lead to the belief that the cystic artery might arise from any one of a number of sources. Such, actually, is the case. Although the artery most frequently arises near the liver from the adjacent, or right, division of the hepatic artery proper, it may take origin from any one of a number of sources – the frequency of occurrence decreasing with widening of the space separating the gallbladder from the particular source vessel. While in approximately 60 per cent of the cases the artery arises in the manner just described, it may take origin from such distant vessels as the superior pancreaticoduodenal, the hepatic, the celiac, or even from the superior mesenteric.

Duodenum and pancreas:—The duodenum, or first portion of the small intestine, is firmly attached to the posterior abdominal wall, having lost its primitive mesenterial support in the course of fetal development. The form of the duodenum is that of an incomplete ring, open upward and to the left. In its curve lies the pancreas, and across its ascending, or fourth, part pass the superior mesenteric vessels; into its descending, or second, part empty the pancreatic and common bile ducts.

Because of the relationships thus established between the pancreas and the neighboring structures, variation in form and position become important in surgery and in the radiographic aspect of diagnostic medicine; and to the surgeon, in particular, configuration of the duodenum is a matter of special significance, since the degree to which the C-shaped form becomes altered, determines the extent to which the numerous arteries of duodenal supply become either clumped or spread apart (discussion hereinafter). In the preponderant number of cases (72 per cent), the duodenum assumes the typical form of the letter C. However, in a fair percentage of cases, the pyloric portion of the stomach lies behind the duodenojejunal flexure; less frequently, the reverse is the case, the stomach then being situated in front of the flexure and the fourth (ascending) segment of the duodenum.

It is not always recognized that in the arterial supply of the duodenum and pancreas, there occurs in the duodenal curve an anastomotic system which suggests, in a general way, that by which adjacent vessels of the jejunoileum are brought into arciform communication. Although there exists a generic similarity between the patterns, the pancreaticoduodenal schema differs from the intestinal in two specific respects: first, the origin of each of the contributing arteries is highly variable; second, two loops occur, one in front of, the other behind, the head of the pancreas. Thus, in a typical case the anterior loop would be formed by branches of the gastroduodenal, the posterior loop by joining branches of the

gastroduodenal above and the superior mesenteric below. Double arcades (anterior and posterior) were found in 297 of 300 consecutive specimens.* The combination of arterial sources just described occurred in more than two-thirds of the specimens, the remaining one-third comprising many different types of origin and of communication of the contributory vessels.

Jejunoileum:—The intestinal arteries, familiarly described as being twelve to twenty in number, arise from the convexity of the arch of the superior mesenteric artery, as the latter vessel courses downward to the right iliac fossa from a point slightly to the left of the median plane. Each intestinal artery is said to bifurcate and to form arciform anastomoses with branches of neighboring vessels; from these loops, further anastomoses are formed, in increasing series distalward along the jejunoileum until as many as five series of loops (arcades) may follow one upon another from the source-artery to the intestine. From the last arch numerous branches, equidistant from one another and of equal size, pass to the small intestine.

The regularly described scheme of division, fusion and branching does obtain; however, the number of vessels is much greater than regularly described: from approximately 250 arcades, arise almost 500 *vasa recta*, from which latter come approximately 1,000 terminal branches.

Cecum and appendix:—Usually, in the course of fetal development, the ascending colon and its mesentery, the sigmoid mesocolon, become attached to the peritoneum of the posterior abdominal wall. However, fusion is not likely to extend as far downward as the cecum. As a consequence, behind the cecum is found a prolongation of the peritoneal cavity, the cecal fossa, which is open inferiorly and bounded by peritoneal folds; from its summit, or cupula, lesser depressions, termed retrocecal recesses, extend upward, in some instances prolonged behind the ascending colon to the height of the right colic flexure.

In some specimens the appendix is related to an ample fold of peritoneum; less commonly it is lodged in a retrocecal position. Fixation of the cecum may be complete, or attachment may affect the ileocecal junctions, leaving the cecum free. In some cases the cecum and ileum may be wholly free.

When the cecum and ileum are fixed, the arteries of supply are retroperitoneal in location; when free, the vessels are mesenterial. The pattern of arterial source and distribution is as variable as is the degree of cecal attachment. The most common sources of origin of the appendiceal artery are the ileal division of the ileocolic artery and the ileocolic itself; together they make up 77 per cent of cases. The appendiceal arises from the cecal infrequently, least frequently from the right colic division of the ileocolic artery.

Large intestine:—The ileocolic artery, from the right side of the superior mesenteric, runs downward, behind the parietal peritoneum to the point of con-

*Unpublished study by W. C. Hambley and B. J. Anson.

tinuity of the ileum with cecum; it anastomoses with the last ileal artery (of the intestinal series) and with the right colic artery. Next, and likewise in retroperitoneal course, the right colic artery passes to the ascending colon; it sends an anastomotic division downward to the ileocolic, another upward to the middle colic. The middle colic artery courses forward in the transverse mesocolon to the mesenterial segment of the large bowel; its anastomotic divisions to the right colic and left colic arteries are similar to those of the other branches of the superior mesenteric. The left colic artery, derived from the inferior mesenteric, passes in retroperitoneal position toward the descending colon; its branches anastomose with the middle colic and with the proximal member of the sigmoidal set.

The large intestine is thus supplied by a series of looping arterial branches of both mesenteric arteries, mainly from the superior mesenteric. Typically, and as quite invariably figured, three superior mesenteric branches supply the cecum, ascending and transverse portion of the colon and the proximal part of the descending colon. These arteries (ileocolic, right colic and middle colic) most frequently leave the superior mesenteric separately. Incidentally, it is the first of these, the ileocolic, that, by triradiate division, sends a first branch upward to the ascending colon, one backward to the ileum, and a third, between the others, to the cecum — the last often being the source of the appendiceal artery. This pattern, togther with three other types, makes up approximately 82 per cent of 500 specimens. The other three common types are the following: absence of right colic; absence of separate middle colic; and origin of the right and middle colic by a common stem. All other types, thirteen in number, make up the remaining 18 per cent of cases. Among these may be mentioned an arrangement in which a middle colic is wanting, the remaining two arteries of the "standard" set of three either arising separately from the superior mesenteric or by a common stem; one in which the middle colic occurs in duplicate; and an arrangement in which large colic vessels are so numerous and intercommunications so frequent as to resemble the arcade system of jejunoileal supply.

The number of arteries reaching the wall of the large intestines is much smaller than the number (approximately 1,000) which end on the jejunoileum. For the ascending colon, in a series of 14 specimens, the number of terminal arteries ranged from 14 to 86, for the transverse colon from 32 to 124, and for the descending colon, from 18 to 89. The disparity in number of vessels supplying any one of the three segments is owing in part, at least, to variability in length of the subdivisions of the large intestine in different specimens.*

Variations in the arterial supply of the descending colon are far less frequent. Usually there is a single major branch, the left colic. The inferior mesenteric, continuing as the superior hemorrhoidal, gives off several sigmoidal branches.

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*Unpublished study by J. Sonneland and B. J. Anson.

In general, the arrangement of tributary convergence of the intestinal and colic veins matches that of the divergence of the arteries of supply. However, as the larger venous tributaries approach the portal vein, similarity of their pattern to that of vessels derived from the mesenteric arteries begins to lessen. As would be expected, too, the formation of the portal vein is variable.

The relation between the visceral tributaries of the portal vein and the veins of the dorsal body wall, kidneys and suprarenal glands is topographically very close. However, there similarity ends. In the case of the drainage of the descending colon, for example, the colic veins overlie those of the parietes and retroperitoneal organs. This is, of course, a secondary relationship, established in the fetus when the descending mesocolon was lost through fusion with the peritoneum which lined the abdominal cavity. As a result of the fusion, the branches of the anastomotic vascular loops come to lie superficial to the arteries and veins of the kidney. The renal veins, with those of the suprarenal gland, drain into the inferior vena cava. The renal vein often receives such additional tributaries as the ascending lumbar, azygos communications and an accessory inferior vena cava. The portal vein, on the contrary, receives most of the drainage of the abdominal and pelvic portions of the alimentary tract. However, the separation between the portal (visceral, splanchnic) system and the caval (parietal) system is not complete, since the most distal veins of the alimentary set, the inferior hemorrhoidals, drain into the channels which, through the hypogastric vein, reach the inferior vena cava.

Sigmoid colon:—Because the sigmoid portion of the colon possesses a mesentery, its position in the pelvis is highly variable. When the mesentery is short, the course of the colon is fairly direct in passing from the left iliac fossa obliquely downward to, or beyond, the midline of the sacrum. However, an elongate mesentery, with a lengthy sigmoidal segment, permits looping upward, beyond the pelvic cavity, into the abdomen.

The form which the colon happens to assume does not necessarily indicate the course or length of the line of parietal attachment of its mesentery. This line of attachment is highly variable, very different, in many cases, from the type regularly figured. Thus, in two-thirds of 220 specimens studied, the line of origin of the sigmoid mesocolon was not S-shaped; actually it was almost straight while following the expected oblique course. Far less frequently it was sigmoid, less frequently still its form was that of an inverted letter U. Least frequently, its attachment was vertical, well removed from the sacrum, sometimes being confined to the area of left wing of the sacrum in the false pelvis.

Like the blood-vessels sent to the ascending and descending portions of the colon, the arteries and veins of the rectum are retroperitoneal in location. On the contrary, the vessels of the sigmoid colon, like those of the transverse colon, are typically mesenterial, being lodged between apposed layers of a sigmoid mesocolon. Of course, the degree to which they are enclosed between such serous

coats depends upon the extent to which the mesocolon escaped fusion with the parietal peritoneum during the course of the individual's fetal development. This is a matter of extreme variation, as has just been described.

Although extremes are noted in the degree to which the sigmoid colon retains a mesentery, and, therefore, in that to which the vessels are mesenterial or retroperitoneal, the pattern of arterial supply is quite constant. Several loops, like those which characterize the proximal colic pattern, intervene between the left colic and the superior hemorrhoidal branches of the inferior mesenteric.

Discussion

Dr. O. H. Wangensteen:—Dr. Anson has done us a great service in bringing this interesting presentation to us. Moreover, those of us who affect an interest in surgery are beholden to Dr. Anson and his colleagues who have worked with him, for furthering our knowledge of the intricacies of many anatomical aspects of surgery.

Now, all of us – and I am thinking also of our forebears, both medical and surgical – were nursed on the bottle of anatomy. Internists rather early gave up anatomy in favor of pathology. Yet, at the present time I believe internists affect an interest in microscopic anatomy which exceeds that of the surgeon.

Many of you, perhaps, are teachers in medical schools. And perhaps some of you, like myself, as we listened to Dr. Anson, reflected on how much of the medical curriculum was once absorbed by anatomy. That is historically very important! Yet, in many schools today, anatomy still holds perhaps a larger proportion of the hours of teaching than some teachers think it should have. In my own school this item has been under discussion in the faculty, and we all know that such problems cannot be resolved fully to everybody's satisfaction without anesthesia, without giving pain to somebody.

I have had the feeling that the anatomy hours of teaching should be shortened in the first year of medical school with the interspersion of some anatomical instruction in the junior and senior years. I have the feeling that maybe an hour in the last two years of medical school might be equivalent to ten hours to a freshman medical student. Anatomy does a great service in initiating medical students in the important discipline of thinking.

As the years have gone by and I have talked with medical students as a teacher of clerks on the ward, interrogating them on anatomical points relating to surgery, I have the impression that they are not so concerned about anatomical knowledge as a surgeon would like to see in medical students. When I ask them, "What book on anatomy do you have?" they are apt to say, "Well, I really have forgotten," or, "I have sold my anatomy book".

Surgery was done a great service when Max Brödel and Howard Kelly, at Johns Hopkins, and Will Mayo in Minnesota, persuaded surgeons to use better

pictorial art in their illustrations. Tradition is important in everything. As I look back upon my undergraduate student days in medicine, I think it fair to say that the pictures in our anatomy texts of that day – in Gray's, Cunningham's, and Morris' anatomies were not as good as they might have been. I hope they are better today. The Chinese proverb: A good book is worth a thousand words, is certainly very true in anatomical illustration.

I think Dr. Anson and his group have pioneered in improving the art and science of anatomy to the eye. When a student is tired of description, he can refresh himself by letting his eye wander over a page of beautiful illustrations. Those of you who, like myself, have looked at the beautiful colored pictures in Sobotta and McMurrich's volumes, have, no doubt, experienced a sense of recovery from the eye fatigue and strains of long reading of detailed descriptive anatomy. It is regrettable that the Spalteholz volumes were not in color. Nowadays, fortunately many more anatomical texts are available in color.

Dr. Anson has talked of some very interesting and important connotations of anatomical knowledge for the surgeon. The anatomical reapers have long since been over the harvest field; moreover, the gleaners too have already been here, and, as someone has aptly said, the geese will follow along presently, and many a time, it does seem that, we are in the "geese stage" now with reference to new anatomical items of significance for the surgeon. Yet, this is just the manner in which surgery of the future will be improved.

The pictures which Dr. Anson has shown us are very interesting indeed. I should like to ask him, if he has any impression as to why surgeons court disaster in trying to mobilize a segment of jejunum to get it into the neck. Why are not the marginal vessels of the jejunum adequate? In mobilizing the transverse colon, if one preserves the marginal blood vessels, the mid colic artery can be cut with total impunity. In mobilizing the jejunum, in dividing successive segmental vessels to the bowel, it is necessary to leave some and not to sacrifice too many at one time, lest gangrene occurs.

Dr. Anson, is there any anatomical explanation for this difference in behavior?

Dr. Allen Boyden, our Professor of Anatomy, and I, in our school long years ago, inaugurated a scheme of devoting one hour once a quarter to an anatomical presentation of the problems involved in a difficult surgical operation. The presentation, obviously, is by Dr. Boyden. Dr. Boyden comes well prepared as Dr. Anson did this morning. I have been tremendously impressed with the gain to my Staff and our students by these presentations. They have reawakened in many a student, I feel certain, a keener interest in anatomy. As yet, however, I have not been able to persuade Dr. Boyden to shorten his hours of instruction in the first year of medicine, taking a few more in the last two years. When such a practice comes to be followed in our medical schools, we will come to have students, I

feel, who will know more anatomy and take a keener interest in it, than is evidenced now by medical students.

Dr. I. Snapper:—Several physicians believe that drugs work differently depending upon whether they are taken by mouth or given by rectum. This is explained by the assumption that substances introduced into the rectum are absorbed via the inferior hemorrhoidal veins and the inferior cava vein whereby the liver would be circumvented. On the other hand, everything taken by mouth has to pass the liver circulation and may be changed by detoxification. I would like to ask whether all this is anatomically correct or whether it is only a supposition.

I want to ask Dr. Anson whether here is an anatomic explanation for the following observation. After ligation of a major branch of a mesenteric artery the gut will remain vital, but if mesenteric artery and vein together or vein alone are ligated, then the gut becomes necrotic.

Dr. Barry J. Anson:—Basing judgment upon general laboratory experience, I should be inclined to believe that the human body would tolerate greater mobilization and displacement of portions of the alimentary tract than is commonly supposed. Recent experience in abdominal and thoracic surgery and more inclusive and older roentgenographic evidence invite such an opinion. Studies in the field of applied anatomy would strengthen this conclusion: viscera are supplied from more numerous vascular sources and by many more terminal vessels than was once supposed; plexiform autonomic innervation is rich; intramuscular (intramural) arteries and veins are known to be abundant, as are likewise those vessels which supply parenchymatous organs. These observations are in accord with those made on bones and on the musculature of the trunk and extremities.

To the questions regarding similarity or differences between cutaneous and visceral types of arterial supply, I am not able to give a satisfactory answer. However, one could be more secure in the matter of vascular flow in the veins which supply viscera. Some veins, like the internal spermatics, possess few valves, any of which may be incompetent; renal veins in some specimens belong in the same category, and doubtless the suprarenal veins could be similarly catalogued. Retrograde flow, in such instance, would be expected when pressures from surrounding structures tend to change the direction of the current. A special problem of interpretation is introduced by the vascular anatomy of a tubular organ which opens upon the surface of the body. The rectum and pelvic colon, obviously, would serve as examples. Receiving the blood from three sources (perineal, pelvic and abdominal) and returning blood to tributaries of the caval and portal systems, the matter of relative pressures would be an important consideration.

In the teaching of anatomy, I firmly believe that instruction in this fundamental field should be carried through the four-year period of the regular curriculum. Following initial presentation of a first-year course, applied anatomy should

be taught in the clinical courses, as a logical basis for pathology, disease, and treatment. Additionally, I believe that a review, in the form of a series of lectures or demonstrations, should be presented by anatomists either to juniors or seniors. Experience in postgraduate teaching, in the planning of instructions for specialty boards and academies, points to the perennial need for anatomical training. This conviction is in agreement with the reported opinion of Dr. Boyden, for whom my continuing admiration was engendered when, as a student at Harvard Medical School, I received part of my training under his superintendence.

AN OVERLOOKED CAUSE OF MORTALITY IN ACUTE APPENDICITIS*

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In the past decade there have been added to the already enormous literature of appendicitis some 20 or more excellent reviews, with careful analyses of the causes of death and detailed statistics showing the steady decline in the mortality rate of this disease (75 per cent), comparing more than favorably with a decline in fatality rate of all surgical diseases (55 per cent), Table I.

While in some of the great world clinics a zero mortality rate since 1946 has been attained in the treatment of this common, deadly, disease, in most of these centers, some residual mortality rates ranging from one to tenths of one per cent are still in evidence, and appear to be an irreducible minimum.

In the analyses of these residual death rates and more so in the much larger fatality rates of decades prior to 1941 and 1931, it has appeared to me that the category "peritonitis" had been overworked as a convenient dumping ground for

TABLE I

PERCENTAGE DECLINE IN MORTALITY*

	Mortality 1933-1937 inclusive	1943-1948 inclusive Mortality	Decline in Mortality
Appendiceal Peritonitis	13.7%	3.1%	77.3%
All Appendicitis	3.27%	0.8%	75.8%
All Surgical Disease	6.88%	3.05%	55.7%

*Lehman, Hawk, Becker 1949.

obscure or overlooked causes of death in acute appendicitis, and that one such overlooked cause has been and is mechanical obstruction of the distal ileum by plastic adhesive deformities accompanying acute appendicitis.

Indeed, by the end of my surgical apprenticeship (1929 - 1934), through my observations of the experiences of others, I had reached the following conclusions on this subject:

1) That an overlooked cause of mortality in acute appendicitis is mechanical obstruction of the distal ileum by plastic adhesive deformities accompanying acute appendicitis complicated by varying degrees of peritoneal contamination, whether the appendix itself is ruptured or not.

*Read before the Sixteenth Annual Convention of the National Gastroenterological Association, Chicago, Ill., 17, 18, 19 September 1951.

2) That these obstructing deformities occur most frequently when the position of the appendix is such that it enters the pelvis or it lies medially among the coils of the ileum (Fig. 1).

3) That the deforming adhesions occur commonly between the ileum, at a short distance from the ileocecal junction, and some points on the wall of the abdomen or pelvis at a lower level; or the deforming adhesion may occur between a few inches of the terminal ileum and the medial wall of a long cecum; or occasionally a combination of both of these fortuitous situations may occur (Figs. 2, 3 and 4).

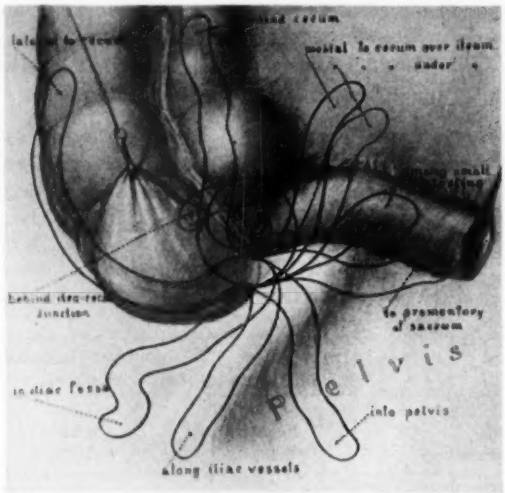

Fig. 1—The various possible positions in which the vermiform appendix is found (after Kelly and Hurdon).

4) That the few cases diagnosed, and reported as postoperative ileal obstruction complicating contaminated acute appendicitis, were cases rather of concomitant ileal obstruction, i.e., the latter complication was already present and detectable at the time of appendectomy or other surgical intervention, and merely went on to become more pronounced postoperatively.

5) That most of these postoperative obstructions were misdiagnosed and mistreated as peritonitis by the surgeon and so tabulated by the statistician, whereas repeated postoperative observations, including abdominal auscultation could have differentiated them from peritonitis and paralytic ileus and they could have been promptly and properly treated as intestinal obstructions.

6) That to boldly separate these deforming adhesions whenever present at the time of appendectomy is as indispensable as the appendectomy itself in saving life; in this matter the prevalent teaching of practicing surgeons and textbooks was against separating such adhesions on the supposition that such procedure would result in spreading of contamination and reformation of new adhesions of similarly adverse pattern.

7) That a few cases of "postoperative peritonitis" recovered after spontaneous fecal fistula had occurred.

Early in 1934 I undertook to test these conclusions on material for which I was personally responsible. Only cases of acute appendicitis, and only those operated upon were included in this study, and for statistical convenience, they were divided into four categories:

1) Simple acute appendicitis, i.e., uncomplicated.

2) Acute appendicitis with contaminated peritoneum but no palpable mass – with and without obstructing ileal adhesions.

3) Acute appendicitis with contaminated peritoneum with palpable mass but no frank pus – with and without obstructing ileal adhesions,

4) Acute appendicitis with frank abscess – with and without obstructing ileal adhesions.

Since the separation of obstructing adhesions of the ileum had not been encouraged and even frowned upon, it was decided to employ this maneuver only in alternate cases. The result of our experience from 1934 to 1941 is shown in Table II. It must be remembered that by 1938 the rational use of chemotherapy was established and that much of the success in dealing, as described above, with the adhesions of ileal obstruction was due to the efficacy of chemotherapy against peritonitis in general.

TABLE II

ST. FRANCIS HOSPITAL, JERSEY CITY, N. J. 1934 TO 1941

Total number of personal cases of acute appendicitis – operated upon	230	
Number of cases of "simple" appendicitis – (uncomplicated, uncontaminated peritoneum)	145	63%
Total number of contaminated and complicated cases	85	37%
Total mortality for 230 cases	7	3.4%
Causes of death—Anesthetic 1, generalized sepsis 1 (1935), pulmonary embolism 1, multiple pyemic abscesses 1 (1934), postoperative ileal obstructions 3.		
Duration of symptoms of simple appendicitis cases	3 to 26 hours.	
Duration of symptoms of 85 contaminated cases before hospitalization	19 hours to 8 days.	
Contaminated cases with adhesive, obstructive ileal deformity found at operation (excluding frank abscess and palpable mass cases)	24	10.4%

All appendectomized.
Obstructing adhesions separated in alternate cases – 50%
Postoperative ileal obstructions – 4 16%

Contaminated cases with adhesive and obstructive deformity of terminal ileum, and with a clinically palpable mass 16 6.9%
All appendectomized.
Obstructing adhesions separated in alternate cases – 50%
Postoperative ileal obstructions – 7 44%

Contaminated cases with frank abscess 19 8.3%
Appendectomized & Drained – 6
Simply drained – 13
P.O. ileal obstructions – 3 15.9%

Total number of cases of postoperative ileal obstruction 14 6.1%
Analysis:–1) Palpable mass group 7 44%
In unrelieved obstruction group 6
In supposedly relieved obstruction group .. 1
Treatment – Intubation and enterostomy proximal to obstruction 4
Intubation and surgical separation of obstructing adhesions 2
Intubation alone ..... 1 – Died – P.M.

2) Frank abscess group 3 15.9%
All in nonappendectomized group
Treatment – Intubation and enterostomy .. 3 – 2 Died (1935, 1936) P.M. 1

3) Contaminated, complicated group, without a palpable mass but with ileal adhesive obstruction 4 16%
All in unrelieved obstruction group.
Treatment – Intubation alone 2
Intubation and enterostomy .. 1
Intubation and surgical separation of obstructing adhesions 1
} All recovered

Total number of cases actually or potentially related to ileal obstruction 59 26%
Mortality in cases of postoperative ileal obstruction 3 22%
In abscess group – 2 – both enterostomies.
In palpable mass group – 1 – intubation alone.

Age group incidence of ileal obstruction –

Decade	1	2	3	4	5	6	7	8	9	10
Postop. instructions	5	0	0	1	1	4	2	1	0	0
Potential obstructions	8	2	2	3	10	14	13	6	1	0

Duration of symptoms of 14 p.o. obstruction cases before hospitalization .....2 to 8 days.

History of previous appendicitis attacks – In 14 p.o. obstruction cases – all – 100%
In 85 complicated and contaminated cases – 51 – 60%
In 59 potentially and or actually obstructed cases – 41 – 69.4%

Predominant symptoms and signs of obstructed cases:–
Vomiting, obstipation, pain, "diarrhea," low-grade fever, rapid pulse, abdominal distention, rushing peristalsis.

Many interesting observations are recorded in this chart but the allotted time permits comment on only a few very outstanding ones:

1) The greater incidence of postoperative ileal obstructions in the cases in which the separation of encountered obstructing adhesions of the ileum was not attempted, and conversely the much smaller incidence in those cases in which this maneuver was carefully carried out at the time of appendectomy.

Fig. 2–Showing deforming, kinking adhesions between the distal ileum and the posterior wall and to itself.

2) The encouraging salvage in the postoperative ileal obstruction cases resulting from their correct diagnosis and prompt treatment by intubation, supportive measures and surgical intervention.

3) The predominance of concomitant and postoperative ileal obstruction in the first, sixth, seventh and eighth decades of life.

4) Their prevalence in cases with a history of previous appendiceal attacks.

5) Their prevalence in cases in which hospitalization and proper treatment had been delayed.

6) Their prevalence in cases that have been considered not classical or atypical in their clinical features.

TABLE III

ST. FRANCIS HOSPITAL, JERSEY CITY, N. J. 1941 TO JULY 1951

Total number of personal cases of acute appendicitis – operated upon 287

Number of cases of "simple" appendicitis – (uncomplicated, uncontaminated peritoneum)	205	71.5%
Total number of contaminated and complicated cases	82	28.5%
Total mortality for 287 cases	1	0.34%

Cause of death:– Postoperative obstruction of the distal ileum after laparotomy and drainage of appendiceal abscess.

Duration of symptoms of simple appendicitis cases .... 2 to 20 hours

Duration of symptoms of 82 contaminated cases before hospitalization .....23 hours to 6¾ days

Contaminated cases with adhesive, obstructive ileal deformity found at operation (excluding frank abscess and palpable mass cases)	16	5.5%

All appendectomized.
Obstructing adhesions separated in all cases.
No postoperative ileal obstructions.

Contaminated cases with adhesive and obstructive deformity of terminal ileum, and with a clinically palpable mass	7	2.4%

All appendectomized.
Obstructing adhesions separated in all cases.
Postoperative ileal obstructions – 3 42.6%

Contaminated cases with frank abscess	5	1.7%

Appendectomized – 4
Simply drained – 1
P.O. ileal obstruction – 1 20% Died

Total number of cases of postoperative ileal obstruction	4	1.4%
Analysis:–1) Palpable mass group	7	44%

Treatment – 1 intubation alone.
2 aseptic enterostomy of Wangensteen type. } All recovered

2) Frank abscess group	1	25%

Treatment – Intubation alone – terminal cardiac – died
(Surgical intervention indicated)

3) Contaminated, complicated group, without a palpable mass but with ileal adhesive obstruction	0	0
Total number of cases actually or potentially related to ileal obstruction	28	9.8%
Mortality in cases of postoperative ileal obstruction	1	25%

Age group incidence of ileal obstruction –

Decade	1	2	3	4	5	6	7	8	9	10
Postop. obstructions	2	0	0	0	0	1	1	0	0	0
Potential obstructions	5	1	0	2	7	9	3	1	0	0

Duration of symptoms of 4 p.o. obstruction cases before hospitalization .....32 hours to 6¾ days.

History of previous appendicitis attacks – In 4 obstruction cases – all – 100%
In 82 contaminated cases – 51 – 63%
In 28 potentially and or actually obstructed cases – 20 – 71%

Predominant symptoms and signs of obstructed cases:–
Vomiting, obstipation, pain, "diarrhea," low-grade fever, rapid pulse, abdominal distention, stormy metallic tinkling peristalsis.

By the beginning of 1941 we felt sufficiently encouraged to separate obstructing adhesions in all cases in which they were encountered at appendectomy. Table III shows in detail our experiences from 1941 to July 1951. By 1947 the rational use of the antibiotics in high dosage for peritonitis was well established, accounting in large measure for decreases in the number of contaminated cases, for the prompter resolution of established peritoneal contamination, for the almost complete disappearance of peritonitis as a cause of death, and for the decrease in the number of obstructing plastic adhesions of the terminal ileum. Furthermore, under the actual or potential antibacterial protection of adequate antibiotic therapy,

Fig. 3—Showing obstructing kink caused by adhesions of terminal ileum to a long medial cecal wall.

which has enlarged the scope of all surgery in general, and that of this problem in particular, there has been a considerable increase in the number of appendectomies made possible in those categories where restraint was rather the rule. However, the antibiotics, as shown by Wright, Schreiber, et al in June 1951 are not as dramatically successful alone in the treatment of established intestinal obstruction; they will help only in the case that is properly and promptly treated surgically.

Table IV shows the experience in cases of all types of acute appendicitis of the entire hospital. The figures show to the credit of the surgical staff a mortality

rate of 0.66 per cent as represented by 12 deaths, 6 of which or 50 per cent, however, were due to postoperative obstruction of the distal ileum. This confirms the high mortality in the obstruction cases not promptly diagnosed and treated, and their confusion with peritonitis.

While this work on ileal obstruction was being done, it was continually observed elsewhere that when a contaminated peritoneum was entered, especially one which had been treated expectantly for "pus localization" and then found to be in the category of mass without frank pus, the surgeon would beat a hasty retreat, removing the appendix only if it was temptingly obtrusive, but more often quickly inserting a drain at what was thought to be a strategic point. The

TABLE IV

ST. FRANCIS HOSPITAL, JERSEY CITY, N. J. 1941 TO JULY 1951

Total number of hospital cases of acute appendicitis – operated upon		1763	
Hospital mortality in these cases		12	0.66%
Causes of death other than ileal obstruction –			
Anesthetic	1		
Generalized sepsis and peritonitis	2		
Congestive cardiac failure	1		
Coronary occlusion	1		
Status lymphaticus	1		
Cause of death – Postoperative distal ileal obstruction		6	50%
Autopsy confirmation		4	66⅔%
All 6 cases had received adequate anti-bacterial treatmeat.			
All had been clinically diagnosed peritonitis.			
None reoperated upon for the ileal obstruction.			

Age group incidence of ileal obstruction –

Decade	1	2	3	4	5	6	7	8	9	10
Cases	1	0	0	0	1	2	1	1	0	0

History of previous appendicitis attacks in ileal obstruction cases	6
Duration of symptoms of these 6 cases prior to hospitalization	36 hours to 6 days.
Time interval before operation after admission of these 6 cases	1 to 48 hours.
Operative procedures in these cases –	
Appendectomy & Drainage	2
Laparotomy & Drainage	4
Number of re-operations for obstruction	0

Predominant symptoms and signs in the 6 fatal cases –
Vomiting, pain, obstipation, low-grade fever, rapid pulse, abdominal distention.

retreat was always covered either by the famous incantation – "Get in quick and get out quicker" or the less famous – "Let's get out o' here". It is my opinion that too long and too unquestioning adherence to this dictum has played a large part in the overlooking of distal ileal obstruction at the first surgical intervention for appendicitis.

It must not be assumed for a moment that I would come to this great metropolis, hallowed by the pioneer work of the great John B. Murphy, to irreverently take exception to a dictum of his which has saved countless lives while and where it was applicable. But the bold and quick surgical intrusions of Murphy's rough

and ready days have evolved through the growth of all the surgical sciences to the deliberate, unhurried, exquisite craftsmanship of our day, and thus his dictum, when now applied, is an unwarranted anachronism. With today's antibacterial protection we can "Get in quick, carefully finish our work, and only then get out".

The lessons imparted by this review are:

1) That early diagnosis and operation before the onset of peritoneal contamination is still the cornerstone in the treatment of appendicitis and the prevention of its complications.

Fig. 4—Portraying 3 types of obstructing deformity of the distal ileum existing concomitantly:
1) Ileum to cecal wall.
2) Ileum to posterior abdominal wall.
3) Ileum to ileum. (Note distention of ileum proximal to obstruction.)

2) That separation of obstructive ileal adhesions at the time of appendectomy is not only feasible and safe under antibacterial protection, but as necessary to the saving of life as appendectomy itself.

3) That early diagnosis and treatment of postoperative ileal obstruction will palpably reduce the residual mortality of appendicitis.

4) That this applies emphatically to cases with a history of previous appendicitis attacks, atypical history, the very young and the very old.

Ed Note. Extensive bibliography will appear in the reprints.

SIGMOIDORECTAL INTUSSUSCEPTION: A COMMON CLINICAL SYNDROME*†

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This condition is a true intussusception of the sigmoid which invaginates into the ampullary portion of the rectum in the region of the rectosigmoidal junction. It differs from other types of intussusception in that it rarely becomes strangulated or completely obstructed. On the contrary, the intussusception occurs intermittently and it reduces itself spontaneously. It has also been described as a procidentia of the sigmoid. When accurate terminology is used, prolapse, as applied to the anorectal region, refers to downward displacement of the mucous membrane only, whereas procidentia implies a descent of all the coats of the bowel.

Although clearly and accurately described seventy years ago and repeatedly since in all textbooks dealing with proctology[1], the syndrome of sigmoidorectal intussusception is generally unknown. The reasons for this relative obscurity will be discussed presently. The clinical picture resulting from the descent of the sigmoid into the rectum varies widely in individual cases and is often bizarre. It can be best presented by quoting the clinical descriptions of early authors. William Allingham[2] in 1882 wrote, "There is a variety of procidentia which one may call intussusception, the upper part of the rectum descending through the lower part; . . . it gives rise to a train of very distressing symptoms; a sensation of burning and fullness in the bowel attended with tenesmus and difficulty in defecation."

In 1890 Harrison Cripps[3] described the syndrome as follows: "the chief symptom is a peculiar difficulty in passing the motions; in other cases in addition to this there is a certain amount of mucoid discharge. The patients generally complain of constipation, for which they have acquired the habit of taking various purgative medicines. They complain that, on going to the closet, they have a sensation of wanting to pass a motion without the ability to do so, and that the more they strain, the greater is the difficulty." He further states that "If, after the bowel has been washed out with an injection, the finger is passed within it, and the patient requested to strain down, folds of loose mucous membrane can be felt crowding down on the finger. By a little manipulation it may be ascertained that these folds are nothing more than the upper and middle part of the rectum

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†From the Surgical Service (Proctology). French Hospital, N. Y. C.

invaginated into the lower portion." Charles Kelsey[4] in 1893 wrote, "The thing most decidedly complained of is a peculiar straining and difficulty in defection. The patient will say that when he strains the bowel seems to become closed, and that no amount of effort will overcome the obstruction; that to have a passage he has to assume an unnatural position. One of my patients could only relieve himself in the knee-elbow position and the other only when lying down."

To recapitulate, characteristically a sense of unsatisfactory and incomplete evacuation remains after defecation. There is a feeling that something remains that should be expelled; consequently the patient sits and strains inordinately. This aggravates the tendency to intussusception. As a result of its frequent descent and recession, congestion and superficial erosion of the mucosa at the apex of the intussusceptum occurs, to result in the discharge of glairy or even bloody mucus. A heavy dragging sensation in the pelvis and in the lumbar-sacral regions may be present together with a dull aching pain referred to the perineum and down the thighs. Constipation alternating with diarrhea, flatulence and abdominal cramps are associated symptoms frequently seen. These probably are caused by concomitant hyperirritability of the proximal colon resulting from overlong use of harsh cathartics. Although essentially a chronic relapsing condition, attacks of acute strangulation may occur. Proctalgia fugax (paroxysmal rectal cramp) occurs infrequently in about a third of patients with sigmoidorectal intussusception[5].

The mechanics of the intussusception is dependent chiefly upon three anatomical features — 1) abnormal mobility of the sigmoid due to redundancy and a long mesentery; 2) rigid fixation of the rectum and rectosigmoid junction by the pelvic and sacral fascia; 3) the narrow caliber of the sigmoid which is easily encompassed in the voluminous lumen of the rectum. Anatomically the infraperitoneal fascial supports of the rectum reach higher on its posterior aspect thereby leaving a weak anterior rectal segment adjacent to the recto-vesicle pouch. This weak anterior rectal wall is vulnerable to increased intraperitoneal pressure so that invagination can and does occur readily in this region. Alexis Moschcowitz in 1912 described this vulnerable point in his description of complete procidentia of the rectum as an anterior rectal hernia.

When symptoms such as recalcitrant constipation, tenesmus, "dragging discomfort" in the pelvis and perineum, bloody mucoid discharge, defecatory proctalgia or proctalgia fugax are elicited, the possibility of sigmoidorectal intussusception as the cause thereof should be considered.

Sigmoidorectal intussusception is a common clinical syndrome. We generally fail to diagnose this condition because ordinarily we sigmoidoscope patients in the inverted or knee-shoulder position. In the inverted patient the force of gravity acting cephalad, plus the force of the atmospheric pressure entering through the scope displaces the prolapsed sigmoid into its normal anatomical position in the proximal pelvis. However, if this patient is examined in the Sims' position the procidentia can be readily demonstrated. The instrument is again passed full length

into the sigmoid of the now recumbent patient. Air insufflation facilitates this maneuver by dilating the lumen thereby increasing the range of visibility. The scope is now slowly withdrawn and the air is allowed to escape by removing the air sealing window. When the scope reaches the ampullary rectum and the distal aspect of the rectosigmoidal junction can be visualized, the patient is asked to "strain down". The sigmoid is seen to prolapse through the rectosigmoid usually appearing first at the anterior aspect of the rectum. With further withdrawal of the instrument and continued straining by the patient, the apex of the intussusceptum frequently can be seen to descend to the sphincteric rectum. If digital examination is now performed the apex of the sigmoidal intussusceptum is palpable. This firm knuckle of sigmoid feels soft, slippery and often sausage-like. Finger pressure thereon elicits severe rectal pain.

Strangulation, though uncommon, may occur. Monsarrat[6] of Liverpool explored a 46 year old male for acute, low intestinal obstruction. He found the sigmoid invaginated into the rectum. The strangulated sigmoid loop was reduced by traction through the abdomen and sutured to the pelvic brim. He reported three other cases which were similar.

My own experience consists of two cases both females in which the sigmoid was incarcerated into the rectum at the rectosigmoidal junction. The first patient was seen in 1946 and had a clinical picture suggestive of acute sigmoidal diverticulitis. However, obstipation was present and on examination a velvety-soft, edematous, tender, injected segment of intestine with an obliterated lumen was palpated and visualized endoscopically in the rectal ampulla. This mass of gut was firmly incarcerated and could not be replaced above the rectosigmoid by manipulation from below. The patient was treated expectantly. Fortunately, edema of the incarcerated sigmoid subsided so that manual reduction was accomplished after several days. Subsequent investigation by barium enema revealed only one diverticulum in the sigmoid and sigmoidoscopy repeatedly demonstrated sigmoidórectal procidentia. In the five years that have elapsed incarceration has not recurred although she complains frequently of episodes of pain in the left lower quadrant and pelvis.

The second case was clinically similar and recently was brought to my attention by Dr. S. S. Pearl of Elizabeth, N. J. The intussusceptum was palpable as "a rubbery, annular, interluminary 'neoplasm', and was firmly fixed in the rectum; the border was polypoid and the lumen narrowed barely admitting one finger . . . Biopsies taken from several areas were reported as 'acute proctitis'. Barium enema revealed a 'ball-valve' type of obstruction at the rectosigmoid." The swollen intussusceptum subsided under expectant treatment including antibiotics so that it could no longer be palpable after ten days. Subsequent sigmoidoscopic examination revealed sigmoidorectal procidentia. There has been no recurrence of incarceration in an 18 month follow-up period.

Many attempts have been made to demonstrate the sigmoidal intussusceptum roentgenographically using various positions, barium mixtures of varying viscosity, consistency and density, alone, or combined with air insufflation. As yet, I have not developed a uniformly satisfactory technic.

Treatment

It should be noted that anorectal inflammatory lesions such as chronic fissures, cryptitis, papillitis and pectenosis are frequently present. These must be eradicated by anoplastic surgery thereby eliminating neuromuscular reflex effects so frequently a causative factor resulting in a hyperirritable spastic colon[7].

The constitutional nature of sigmoidorectal intussusception increases the difficulty in attaining successful treatment. The prolonged chronicity of the associated constipation and the abuse to which the colon has been subjected by previously ill advised treatment with harsh cathartics presents a therapeutic challenge known to all. Added to this is the fact that many patients are women, in or past the climacteric, some with personality difficulties and others with definite psychoneurotic traits.

Relief of anxiety in such patients (many of whom have cancer phobia) can be attained by patiently and simply explaining to the patient the mechanics of the disturbance at the conclusion of a very complete examination which must include a barium enema and sigmoidoscopy. Harsh cathartics are banned. A high protein, high vitamin, low roughage diet is ordered. Hydrophilic preparations, (psyllium, methylcellulose, etc.) are administered in sufficient and frequent dosage so as to produce a firm, slippery stool of large size. This firm, bulky stool mass fills and dilates the distal sigmoid. It will slip through the rectosigmoidal junction readily and easily to completely fill the ampulla of the rectum, thereby forestalling sigmoidal invagination. Patients are cautioned against straining unduly at stool. Should no bowel action result for two days, a plain warm water enema, no more than a pint at a time, best taken before retiring is advised. This must be administered with the patient supine and with knees drawn up on the abdomen. In this position, the hydrostatic pressure will mechanically reduce the "plug-like" sigmoidal intussusceptum which prevents the fecal mass from passing into the rectum. Mild sedation, antispasmodics, the hormones, (estrogen, testosterone, thyroid) are necessary adjuvants of treatment when indicated by general medical condition of the patient.

Constant reassurance, skillful expectant management of symptomatic episodes and considerable patience on the part of the physician should result in satisfactory therapeutic results. In severe intractable cases, resection of the redundant sigmoid and obliteration of the anterior rectal peritoneal hernia by plastic obliteration of the pouch of Douglas (Moschcowitz' operation) might be considered as a radical means of attaining cure. One such symptomatically intractable case occurring in a physician was treated surgically with success[8].

Summary

1. Although repeatedly described for over seventy years the syndrome resulting from sigmoidorectal intussusception is generally obscure.

2. Typical symptoms include extreme chronic constipation, defecation characterized by a sense of incomplete evacuation, tenesmus, occasional bloody mucoid dejections, "dragging discomfort" in the pelvis and perineum, defecatory proctalgia and occasionally, proctalgia fugax.

3. We frequently fail to diagnose sigmoidorectal procidentia because we generally sigmoidoscope patients in the inverted knee-shoulder position in which the intussusceptum spontaneously reduces itself. The lesion is easily demonstrated if the patient is re-examined in the recumbent Sims' position.

4. Incarceration or strangulation of the intussuscepted sigmoid may occur and two cases have been described.

5. Treatment is generally satisfactory but requires patience, tact and persistence on the part of the physician and faithful cooperation on the part of the patient.

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LACK OF CORRELATION BETWEEN SYMPTOMS AND FINDINGS IN INTESTINAL OBSTRUCTION*

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Times have passed since patients with intestinal obstruction were rushed to the hospitals, taken to the operating room, and explored as fast as possible. New ways of diagnosis and treatment are responsible for the necessary delay. Because of a better work-up and improved preparation of the patients we see a greater success in the treatment of this condition. Lack of correlation between symptoms and findings in intestinal obstruction is a negative title. It means that in certain cases either symptoms are missing in the presence of pathological conditions, or symptoms are present while the pathological condition is not such a one to be expected. This lack of correlation will be the cause of an error in diagnosis sometimes with catastrophal consequences in a very serious disease.

Dr. Mosely and I have looked through the material of intestinal obstruction at Sydenham Hospital. In a great number of cases which will be presented in a more elaborate paper, we have found an amazing number of cases where this incongruence was noted. We have selected cases which seem to be of importance. We feel that to be aware of this lack of correlation will help us to improve our knowledge and better the outcome in the treatment of intestinal obstruction.

History, physical findings and laboratory data are the essentials in making the diagnosis of intestinal obstruction. We cannot depend on one factor alone. Thoroughness in all those investigations are mandatory, but the cases under consideration may not fit in the classical descriptions. We have to scrutinize our results from the viewpoint of the anatomical, physiological and pathological nature of the condition, and have to see whether we are dealing with a functional pathological symptomatology or organic disease.

The first case which will show the divergence of symptoms and findings concerns a 35 year old female doctor. She had five abdominal operations in her history, appendectomy with drainage for perforated appendix, a suspension operation, cesarean section, and two operations for intestinal obstruction caused by adhesions.

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Seven days before admission, she got sick with moderate abdominal pains, nausea, slight vomiting and diarrhea. Nausea and vomiting stopped, diarrhea continued, the pains increased and became excruciating in character. When seen, she had severe abdominal pains, of colic-like character. On the right side the old scars were very tender, and the abdomen rigid. Hyperperistalsis was noticed and borborygmi at the acme of pains. The blood count showed 10,000 WBC, otherwise normal. The x-ray examination revealed only a small amount of gas in a small intestinal loop, no stepladder and no fluid level signs were seen. The diagnosis of small intestinal obstruction was made, and verified during the operation where adhesions were severed, and the volvulus of the small intestinal loop disrotated. The patient did very well for a few days, when severe pains developed again, this time strictly limited to the superficial abdominal wound. Nothing could be found to explain the pain. A neurologist was consulted. He considered the possibility of radiculitis and advised x-ray examination of the spine. The findings were a great surprise. Although the patient was not distended, had no abdominal pains, no signs of peritonitis, and moved her bowels regularly without pains, the x-ray picture showed a distention of numerous loops of bowels large and small ones, with fluid levels, stepladder signs. It could be explained as adynamic ileus. Too often the radiologists unfamiliar with the details of the history or physical clinical examination would have asked whether mechanical or paralytic ileus is present. In this case, we all agreed that the x-ray film alone could not be indicative for any organic conditions. The clinical picture cleared up from that point of view without any further treatment.

The second case concerns a 20 year old patient suffering from gastric distention as long as she could remember. She had one cesarian section, otherwise no surgery performed. After constipation and drastic use of physics with preliminary success, she became so distended that she had to be admitted to the hospital. A very much enlarged tympanic abdomen with gurgling sounds was found. Careful examination seemed to make the diagnosis of intestinal obstruction justified. Decompression with Miller Abbott was done and improved patient's condition only partially. The ex-ray picture showed fluid levels, stepladder formation, and gas from the stomach down to the ileocecal valve.

Exploratory laparotomy was done. No pathological findings except the severe distention of the intestines could be revealed. Bacteriological examinations were negative. After complete investigation of the intestinal tract, the abdominal wall was closed. Re-examination showed again, the large distention of the intestinal tract, this time going down into the large bowel. Fluid levels and stepladder formation were present. This time the possibility was considered that the findings could be indicative of functional disturbance in the sense of Golden's explanation. Barium was given and showed almost a normal x-ray picture of the entire intestinal tract, except for small bowel patterns of disturbed motor function as described by Golden.

The third case is a very tragic one. A 32 year old patient had undergone a total colectomy three years prior to admission. Ileoproctostomy was performed. She was in excellent condition until the day of her admission. Suddenly, severe colic-like pains on the left, radiating to the pelvis had developed. No nausea, no vomiting. Her temperature was 100°, many WBC were found in her urine; also some albumin. WBC was normal. The abdomen was slightly distended. X-ray examination showed moderate amount of gas in her small intestine, and a possible calculus in the ureter. The patient's condition improved after an enema. During the night her condition grew worse. The abdomen was soft at the beginning, but became superficially tender on the left side and very painful on palpation in the back. Temperature became elevated, urea nitrogen 30, RBC still in urine, the small intestines now showed stepladder formation. Patient went into coma, and immediate surgery was done. On operation, a completely gangrenous small intestinal loop with perforation hemorrhagic infarction below the gangrene was found. There was a large foul smelling abscess in the same area. The patient's condition was so poor that only palliative measure could be performed. The patient died soon after operation. Early surgery definitely would have helped to save the patient's life. The misleading symptoms, the unusual laboratory data, and the indefinite findings in x-rays have caused this error in diagnosis.

The fourth case concerns a 59 year old woman with a history of gallbladder disease and previous jaundice. A few days before admission, she got acute pains of colic-like type on the right side. Temperature developed, jaundice appeared. She had no symptoms of any irregularities in her bowel movements. A doctor diagnosed an acute gallbladder condition with possible perforation. Her clinical history, her physical examination, and laboratory data 25,000 WBC seemed to justify this diagnosis. X-ray examination by flat-plate did not show any stones, nor any unusual gas collection in the intestinal tract. At operation, a large carcinoma of the right colon, with infiltration of the surrounding tissue with liver metasasis was present. The colon was completely obstructed. An immediate resection, with ileocolostomy was done, knowing it to be only a palliative procedure. The patient had a smooth postoperative course, and died only 6 months later with symptoms of liver carcinomatosis. She had no intestinal symptoms following the operation.

The absence of obstructive signs was definitely misleading in this case where history and findings were leading towards the wrong diagnosis.

In a presentation of four cases, we have shown that lack of correlation of symptoms and findings in intestinal obstruction may occur. The difficulties in the evaluation of the history, the atypy of clinical data and laboratory findings are responsible especially in the presence of unusual indefinite x-ray findings. Logical explanation is not always possible, even with scrutinizing criticism we may sometimes not be able to overcome difficulties. Functional conditions have to be taken into consideration even in the presence of typical findings. The absence of

x-ray findings, the presence of bowel movement and lack of nausea and vomiting do not rule out intestinal obstruction. Fluid level and stepladder signs may be present in nonorganic conditions: spastic ileus disturbance of motorfunction, sprue of the small bowel (amyloidosis), etc.

Although the contents of our paper may express negative results and errors in diagnosis, we feel that its presentation will be of advantage for better recognition of the serious condition: Intestinal Obstruction.

AN EVALUATION OF THE EFFECT OF A NEW ISATIN COMPOUND ON COLONIC MOTILITY VIA ROENTGENOLOGIC STUDY*

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One of the most frequent complaints encountered in medical practice is constipation. Medical literature abounds with a multiplicity of treatments for this condition. Varying definitions[1-4] have been advanced for constipation. During a previous investigation[3], it was noted that the laity, likewise, attaches various interpretations to the term "constipation". In the absence of lower bowel obstruction

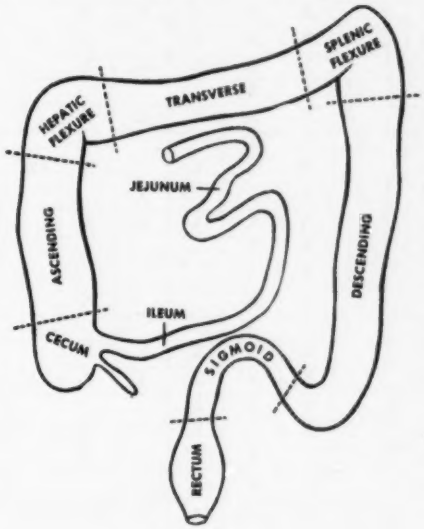

Fig. 1

due to intrinsic or extrinsic lesions[5] constipation may be defined as a sensation of incomplete bowel evacuation and/or a prolongation between a patient's usual periods for defecation.

It is noteworthy that patients with unstable autonomic nervous systems may alternate between constipation and normal or increased bowel activity. In con-

*The isatin compound was made available through a grant by The Harrower Laboratory, Inc., Jersey City, New Jersey and is manufactured under the trade-name Prulose Complex®. Appreciation is hereby expressed for the grant.

tradistinction to obstipation, constipation is a functional disorder wherein all or segments of the colon are spastic and/or atonic. It has been well established that segmental atonicity and spasticity may coexist and result in a derangement of the propulsive mechanism of the colon.

TABLE I

($BaSO_4$ Only – 6 Hours Previously)

First Series

Location of Barium

#	Sex	Age	J	I	Cec.	Asc.	H.Fl.	Trans.	S.Fl.	Desc.	Sigm.	Rect.
1	F	53		X	X	X	X					
2	F	18		X	X	X	X	X				
3	F	49		X	X	X	X	X	X	X		
4	F	45		X	X	X	X	X				
5	F	54	X	X	X							
6	M	52		X	X	X	X	X				
7	M	36	X	X	X							
8	F	53		X	X	X		X	X	X		
9	M	42	X	X	X	X	X					
10	M	40		X	X	X	X	X				
11	M	26		X	X							
12	M	37		X	X							
13	M	50		X	X			X				
14	F	55		X	X							
15	F	40		X	X	X	X	X				
16	F	28		X	X	X	X	X				
17	M	21		X	X	X						
18	M	28		X	X	X		X				
19	F	25			X	X		X		X	X	
20	M	30		X	X	X						
TOTAL			3	19	20	14	9	11	2	3	1	0
TOTAL (Minus non-constipated patients)			1	14	15	11	7	9	2	3	1	0

Hygienic measures, though important for relief of functional disorders, are too frequently inadequate in the treatment of constipation. Consequently, supplementary action must be used.

Methylcellulose has been shown to improve the function of the bowel[6]. This new hydrophilic colloid increases the volume of the stool and prevents inspissation and hardness. Besides being inert, the methoxyl groups are quantitatively excreted[7]. While Methylcellulose partially inhibits the effects of intestinal stimu-

lants, nevertheless, catharsis can be induced with increased doses of the stimulants[8].

The laxative effect of prunes has long been established. Recent investigations[9] tend to support the view that this laxative activity is due, not only to colloidal and emollient action, but also to a disphenyl isatin.

TABLE II

($BaSO_4$ Only — 24 Hours Previously)

First Series

Location of Barium

#	Sex	Age	J	I	Cec.	Asc.	H.Fl.	Trans.	S.Fl.	Desc.	Sigm.	Rect.
1	F	53						X		X	X	
2	F	18			X							X
3	F	49			X			X	X	X		X
4	F	45				X	X	X	X	X		
5	F	54			X			X			X	X
6	M	52			X	X	X	X	X	X		X
7	M	36									X	X
8	F	53			X			X	X	X	X	
9	M	42				X	X	X	X	X	X	
10	M	40						X				
11	M	26			X		X	X	X	X	X	X
12	M	37			X	X	X	X				X
13	M	50			X	X		X	X	X		X
14	F	55			X	X	X	X		X	X	
15	F	40			X	X	X	X				
16	F	28			X	X		X				
17	M	21					X	X	X	X	X	X
18	M	28						X	X	X		X
19	F	25			X	X	X	X		X		
20	M	30			X	X	X	X				
TOTAL			0	0	13	10	10	18	9	12	8	10
TOTAL (Minus non-constipated patients)			0	0	11	8	8	15	7	10	6	6

Animal experimentation has shown that 98 per cent of ingested isatin is excreted in the feces, with no absorption[10]. In order to produce diarrhea, tremendous overdosage was necessary, and the resultant diarrhea subsided in 72 hours; no evidence of occult fecal blood was found. These animals were given, by intubation, doses of 4 to 8 mg., which in this instance, would have been comparable to 34 to 68 mg. per kg. of body weight. In a man weighing 70 kg. effective clinical results will be obtained by the ingestion of 5.0 mg. diacetylhydroxyphenylisatin.

The above three, isatin, dehydrated prune concentrate and methylcellulose were all combined in tablet form. Each tablet contained diacetylhydroxyphenylisatin 0.001 gm., dehydrated prune concentrate 0.13 gm. and methylcellulose 0.39 gm. Their influence on colonic motility was studied radiographically.

TABLE III

($BaSO_4$ Only – 48 Hours Previously)

First Series

Location of Barium

#	Sex	Age	J	I	Cec.	Asc.	H.Fl.	Trans.	S.Fl.	Desc.	Sigm.	Rect.
1	F	53										X
2	F	18			X							X
3	F	49			X							
4	F	45					X	X	X	X	X	
5	F	54						X			X	X
6	M	52						X	X	X	X	X
7	M	36										
8	F	53			X	X	X	X	X	X	X	X
9	M	42						X		X		X
10	M	40										
11	M	26			X					X		X
12	M	37						X				X
13	M	50						X	X	X	X	X
14	F	55				X	X	X				X
15	F	40			X	X	X	X				
16	F	28										
17	M	21									X	X
18	M	28						X	X	X	X	
19	F	25			X	X	X	X	X	X	X	
20	M	30			X			X				
TOTAL			0	0	7	4	5	12	6	8	8	11
TOTAL (Minus non-constipated patients)			0	0	6	4	5	9	5	6	7	8

Procedure

Twenty patients were selected for study. The ages of these patients varied from 18 to 55 years, with an average age of 39.1 years. They were equally divided as to sex. Five (Cases #2, 7, 9, 12 and 18) were not constipated, while the remaining fifteen complained of moderate to severe constipation. All patients were placed on the same bland diet for two weeks before the study was started and

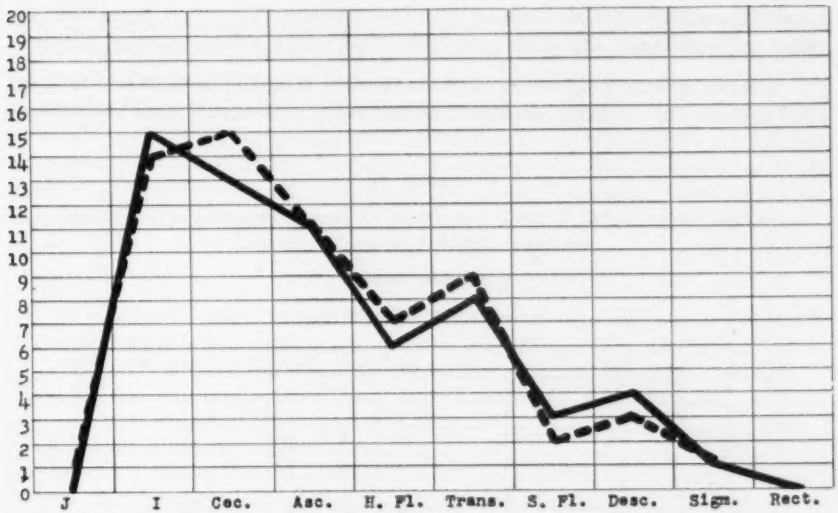

Fig. 2—*Vertically:* Number of patients showing $BaSO_4$ in each of bowel segments.
- - - - Table I, constipated patients — $BaSO_4$ only, 6 hours previously.
——— Table IV, Same constipated patients after receiving 3 tablets medication b.i.d. for 1 month and during this series — $BaSO_4$ 6 hours previously.

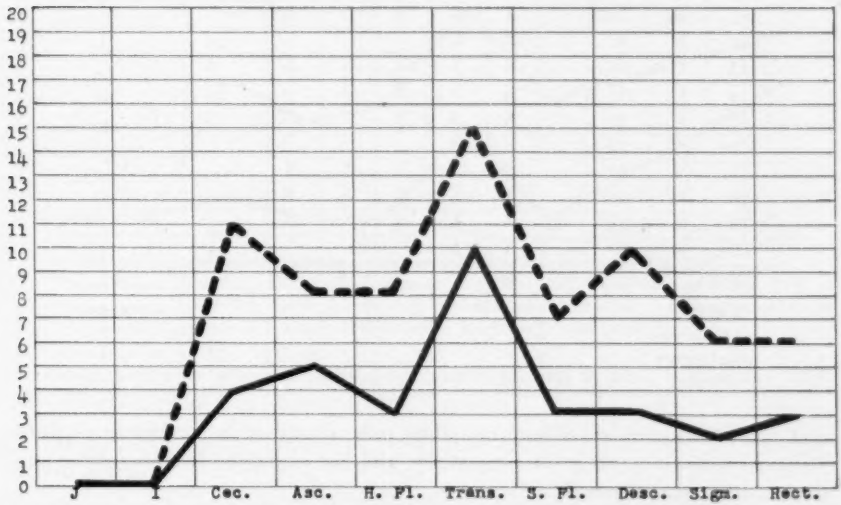

Fig. 3—*Vertically:* Number of patients showing $BaSO_4$ in each of bowel segments.
- - - - Table II, Constipated patients — $BaSO_4$ only, 24 hours previously.
——— Table V, Same constipated patients after receiving 3 tablets medication b.i.d. for 1 month and during this series — $BaSO_4$ 24 hours previously.

remained on that diet throughout this investigation. None was permitted any other medication nor any other procedures that might influence bowel activity.

A series of three x-rays were carried out on each patient at 6, 24 and 48 hours after ingestion of a barium solution. The first series was started after the patients

TABLE IV

(After Patients Had Taken 3 Tablets B.I.D. Daily for 1 Month and During this Series $BaSO_4$ 6 Hours Previously)

Second Series

Location of Barium

#	Sex	Age	J	I	Cec.	Asc.	H.Fl.	Trans.	S.Fl.	Desc.	Sigm.	Rect.
1	F	53		X								
2	F	18		X								
3	F	49		X	X	X	X	X				
4	F	45		X	X	X	X	X				
5	F	54		X								
6	M	52		X	X	X	X	X	X	X		
7	M	36		X	X	X						
8	F	53		X	X	X						
9	M	42		X	X	X	X	X	X	X		X
10	M	40		X	X	X	X			X		
11	M	26		X	X	X		X	X	X		
12	M	37		X	X							
13	M	50		X	X	X	X	X				
14	F	55		X	X	X						
15	F	40		X	X	X		X				
16	F	28		X	X							
17	M	21		X	X	X	X	X	X	X	X	
18	M	28		X	X	X	X	X	X	X	X	
19	F	25		X	X	X		X				
20	M	30		X	X							
TOTAL			0	20	17	14	8	10	5	6	2	1
TOTAL (Minus non-constipated patients)			0	15	13	11	6	8	3	4	1	0

had taken three ounces of barium sulfate only, dissolved in six ounces of water six hours before reporting for x-ray study, and had abstained from ingesting anything during that interval.

A second series of three x-rays on each patient was started one month after completion of the first. During this interval the patients were instructed to take three of the tablets with a full glass of water one hour after breakfast and before

retiring, and to drink at least two more glassesfull of water during the day. Three of the nonconstipated patients experienced slight abdominal cramps with slight diarrhea. After the first day or two, it was suggested that the dose be reduced to two tablets twice daily, and no further untoward effects developed. The preparation for the second roentgenographic series was the same as before, except that the patients continued to take the tablets throughout this series in similar doses as during the preceding month, with the first morning dose being taken while the barium solution was ingested.

Observations

To clarify Tables I through VI the large bowel was subdivided into eight anatomical segments as in the accompanying illustration (Fig. 1). In each table,

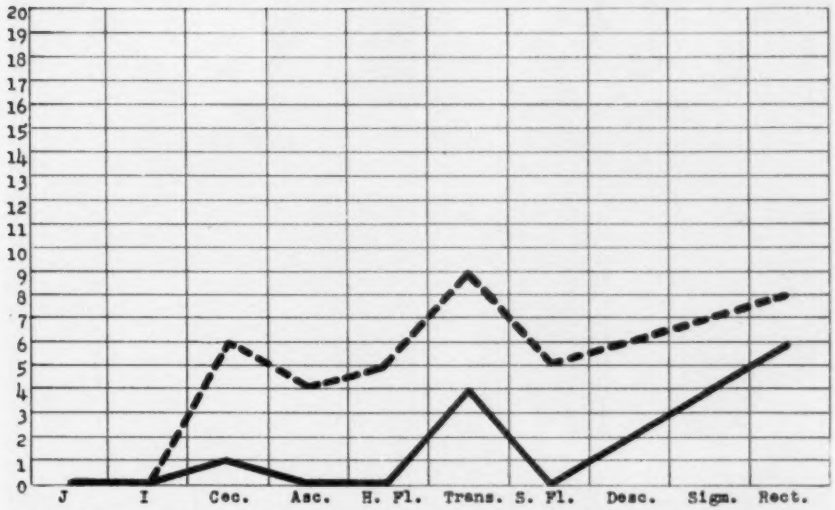

Fig. 4—*Vertically:* Number of patients showing $BaSO_4$ in each of bowel segments.
– – – – Table III, Constipated patients – $BaSO_4$ only, 48 hours previously.
——— Table VI, Same constipated patients after receiving 3 tablets medication b.i.d. for 1 month and during this series – $BaSO_4$ 48 hours previously.

the totals under the lower bowel segments indicate the number of patients who had visualization of that corresponding segment.

At six hours no appreciable changes were noted between the first and the second series.

The frequently troublesome condition of cecal stasis was observed in Table II and Table III at 24 and 48 hours in 11 and 6 patients respectively. Tables V and VI revealed cecal stasis at 24 and 48 hours in 4 and 1 patients respectively. The preparation under investigation was thus effective in decreasing cecal stasis.

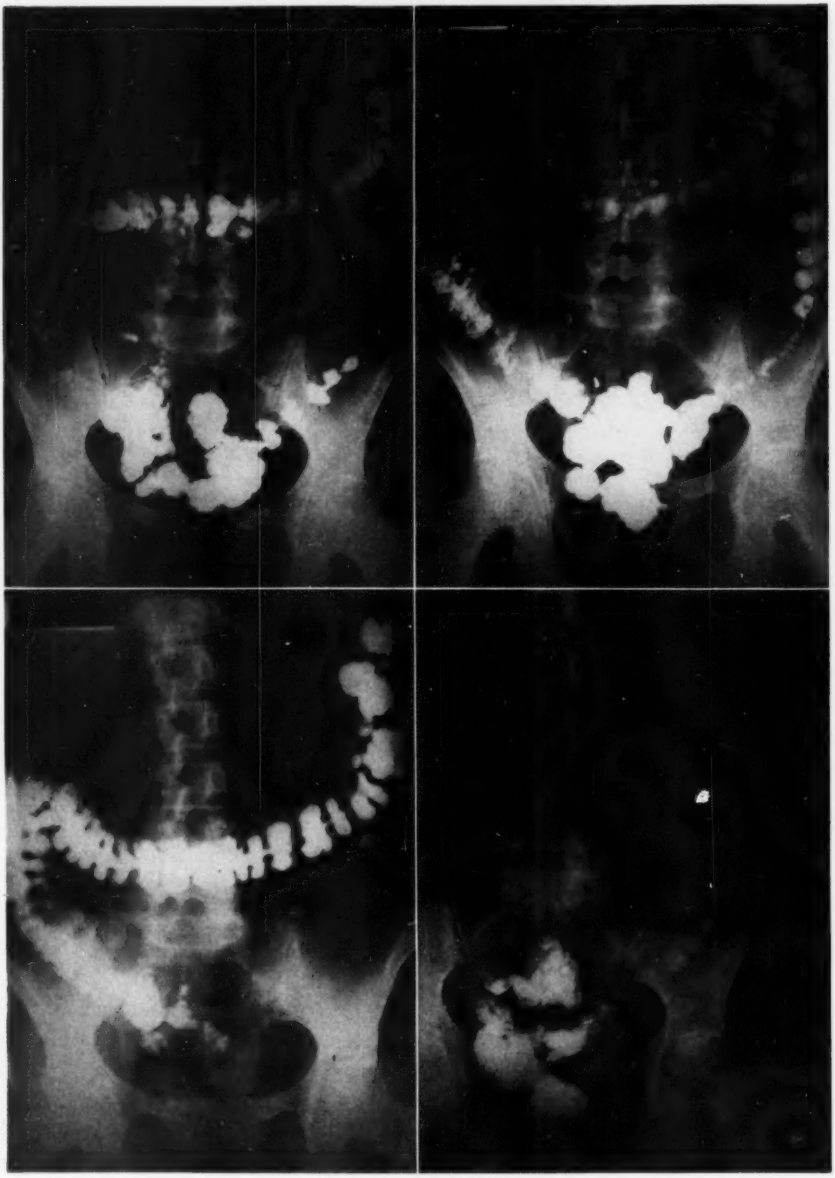

Fig. 5–Top: First Series–Left, 24 hour study; right, 48 hour study.
Bottom: Second Series–Left, 24 hour study; right, 48 hour study.
Case 8, note that compared to the first series, the barium distribution in the second series is within normal limits. Patient was a neurasthenic individual. Bowels moved daily but patient continued to complain of "constipation" while using 3 tablets b.i.d.

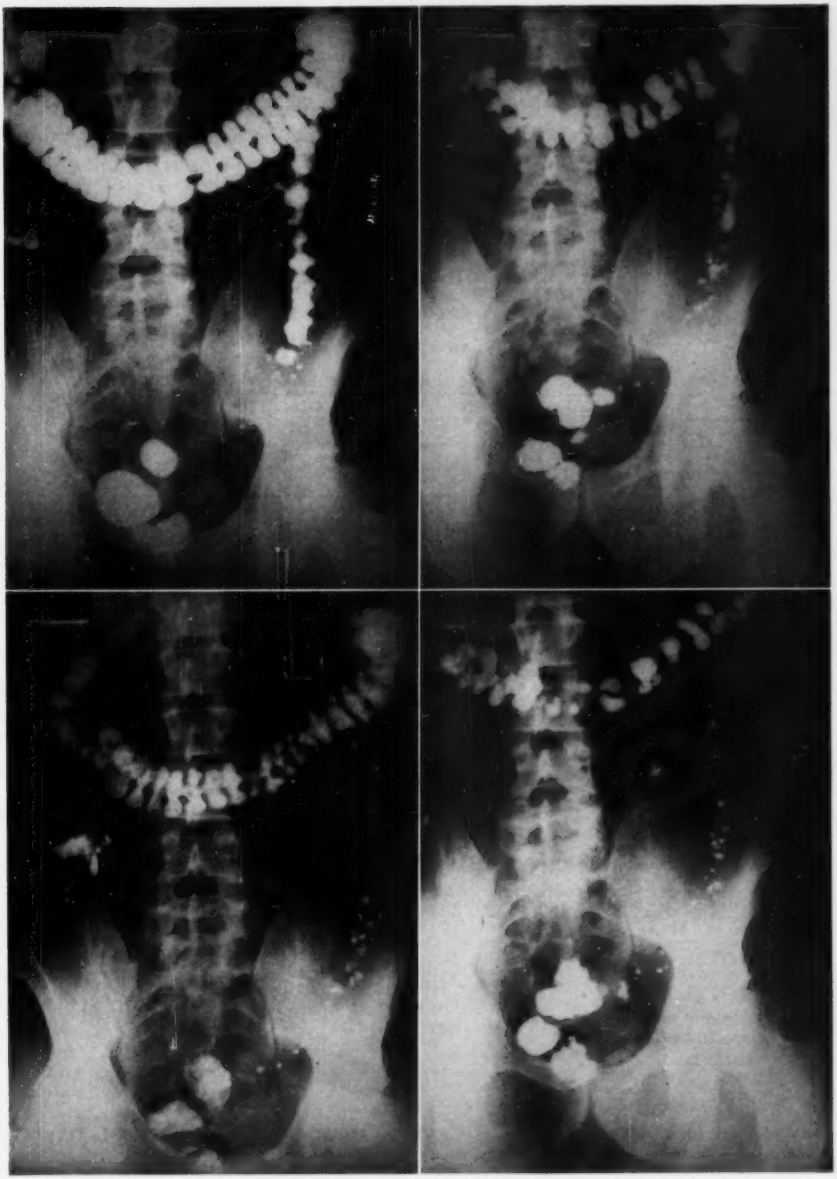

Fig. 6—Top: First Series—Left, 24 hour study; right, 48 hour study.
Bottom: Second Series—Left, 24 hour study; right, 48 hour study.
Case 9, patient had had previous attacks of diverticulitis of the colon. Was not constipated. Uses 2 tablets b.i.d. without untoward effects. Has gained weight and has no gastrointestinal complaints. Bowels move once or twice daily.

The hepatic and splenic flexures are not uncommon sites for stasis of the fecal column. At 24 and 48 hours, the hepatic flexure was visualized in Table II and III in 8 and 5 patients respectively; the splenic flexure was visualized at these hours in 7 and 5 patients respectively. At corresponding hours Tables V and VI

TABLE V

(After Patients Had Taken 3 Tablets B.I.D. Daily for 1 Month and During this Series $BaSO_4$ 24 Hours Previously)

Second Series

Location of Barium

#	Sex	Age	J	I	Cec.	Asc.	H.Fl.	Trans.	S.Fl.	Desc.	Sigm.	Rect.
1	F	53				X	X	X				
2	F	18					X	X				X
3	F	49			X			X			X	X
4	F	45						X	X	X		
5	F	54				X		X				
6	M	52				X	X	X	X	X		X
7	M	36						X	X	X	X	X
8	F	53			X	X	X	X				
9	M	42			X			X	X			X
10	M	40										
11	M	26			X							X
12	M	37			X							
13	M	50			X	X		X	X	X		
14	F	55										
15	F	40						X				
16	F	28										
17	M	21										
18	M	28						X	X	X	X	X
19	F	25						X			X	
20	M	30						X				
TOTAL			0	0	6	5	4	14	6	5	4	7
TOTAL (Minus non-constipated patients)			0	0	4	5	3	10	3	3	2	3

revealed barium at these sites in 3 and 0 patients, and 3 and 0 patients respectively.

The transverse colon was outlined by barium at 24 and 48 hours in 15 and 9 patients respectively in Tables II and III; 10 and 4 patients respectively in Tables V and VI.

The descending colon and sigmoid were visualized at 24 and 48 hours in 10 and 6 patients respectively, and 6 and 7 patients respectively in Tables II and III; 3 and 2 patients respectively, and 2 and 4 patients respectively in Tables V and VI.

While the rectum was outlined at 24 and 48 hours in 6 and 8 patients respectively in Tables II and III, Tables V and VI revealed barium in 3 and 6 patients respectively, with the visualization not intense.

TABLE VI

(After Patients Had Taken 3 Tablets B.I.D. Daily for 1 Month and During this Series $BaSO_4$ 48 Hours Previously)

Second Series

Location of Barium

#	Sex	Age	I	I	Cec.	Asc.	H.Fl.	Trans.	S.Fl.	Desc.	Sigm.	Rect.
1	F	53						X				
2	F	18								X		
3	F	49			X							
4	F	45						X				X
5	F	54									X	X
6	M	52								X		X
7	M	36									X	X
8	F	53									X	X
9	M	42						X				X
10	M	40										
11	M	26										X
12	M	37										
13	M	50								X	X	
14	F	55										
15	F	40						X				
16	F	28										
17	M	21										
18	M	28										
19	F	25						X			X	X
20	M	30										
TOTAL			0	0	1	0	0	5	0	3	5	8
TOTAL (Minus non-constipated patients)			0	0	1	0	0	4	0	2	4	6

For more precise localization of barium within the ascending colon, transverse colon and descending colon, each of these segments was subdivided into three approximate equal divisions, 1, 2 and 3, from proximal to distalward. The average number of these subdivisions containing barium at 6, 24 and 48 hours, is shown in Tables VII and VIII.

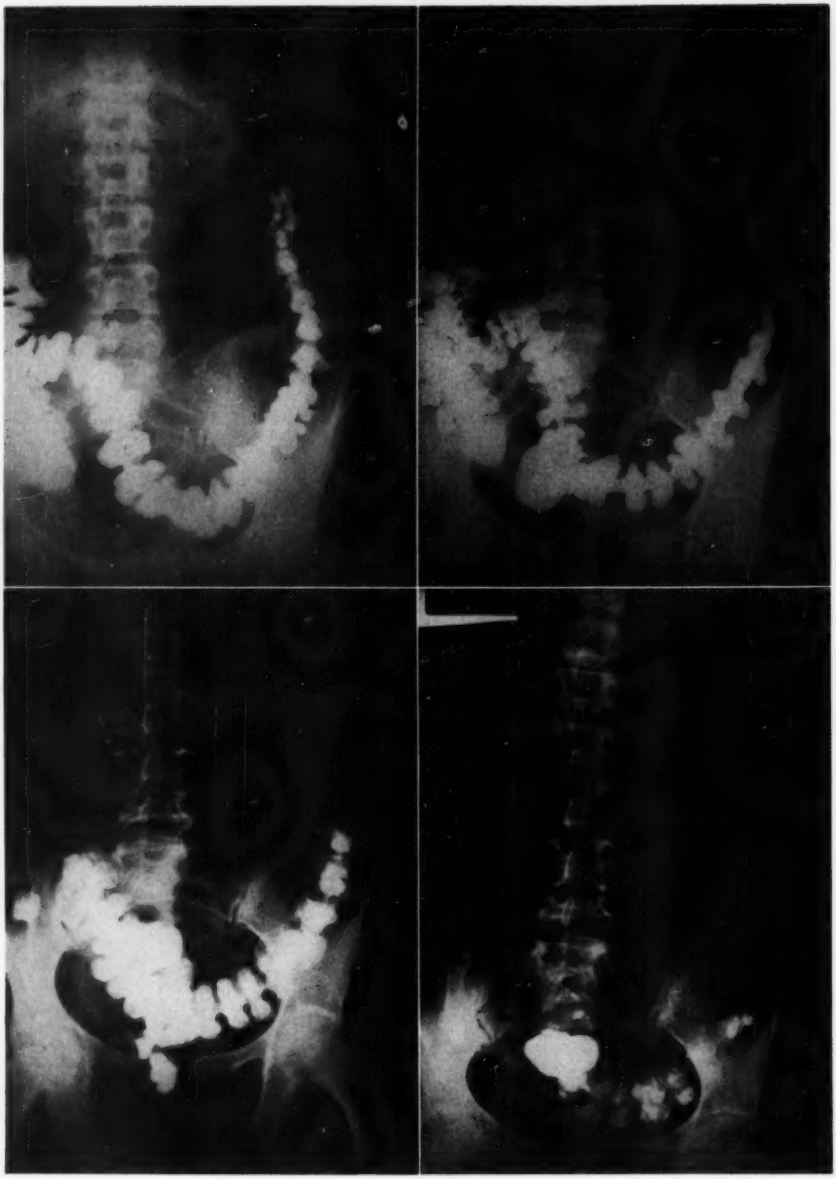

Fig. 7—Top: First Series—Left, 24 hour study; right, 48 hour study.
Bottom: Second Series—Left, 24 hour study; right, 48 hour study.
Case 15, had been having severe headaches and constipation for "many years". Bowels had been moving once every 3 - 5 days. Note barium distribution in second series. Bowels move daily, no headaches and has markedly improved personality changes on 3 tablets b.i.d.

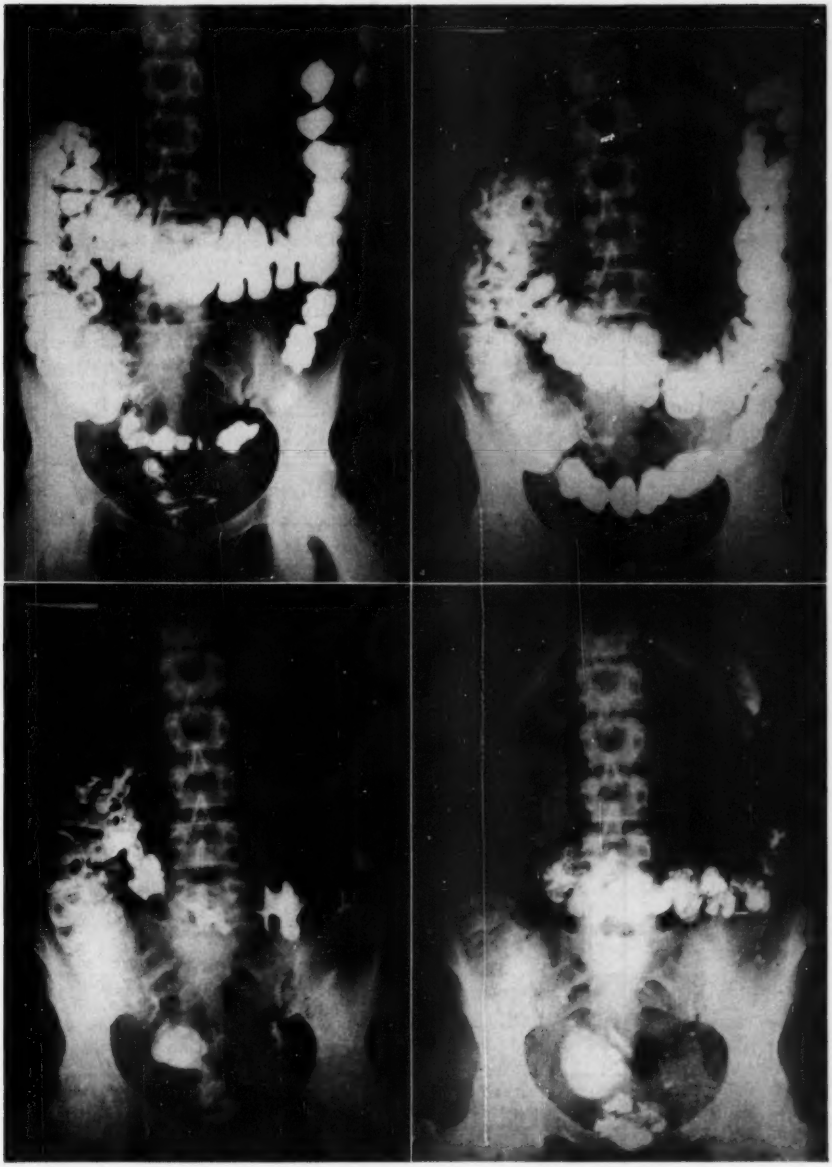

Fig. 8—Top: First Series—Left, 24 hour study; right, 48 hour study.
Bottom: Second Series—Left, 24 hour study; right, 48 hour study.
Case 19, chief complaint was "I have been constipated all my life". Bowels moved once every 4 to 7 days. Note change in barium distribution from first to second series. Bowels move once daily when patient uses 3 tablets b.i.d.

TABLE VII

(First Series)

	Ascending Colon			Transverse Colon			Descending Colon		
	Subdivisions			Subdivisions			Subdivisions		
	1	2	3	1	2	3	1	2	3
6 Hours	14	12	11	11	8	6	3	3	2
*	Averages 12.33			Averages 8.3			Averages 2.66		
24 Hours	8	9	9	16	16	16	10	10	9
*	Averages 8.66			Averages 16			Averages 9.66		
48 Hours	3	3	4	10	11	12	7	6	7
*	Averages 3.33			Averages 11			Averages 6.66		

*Average number of subdivisions containing barium

Clinically, as previously mentioned, Cases #2, 9 and 12 had developed some abdominal cramps and diarrhea during the first few days, while taking three tablets twice daily. When, however, they subsequently reduced the dose to two tablets, these symptoms disappeared. These patients, as well as the other two previously nonconstipated patients, had one or two bowel movements daily

TABLE VIII

(Second Series)

	Ascending Colon			Transverse Colon			Descending Colon		
	Subdivisions			Subdivisions			Subdivisions		
	1	2	3	1	2	3	1	2	3
6 Hours	14	12	11	8	8	4	4	6	5
*	Averages 12.33			Averages 6.66			Averages 5		
24 Hours	3	4	4	7	12	13	4	4	4
*	Averages 3.66			Averages 10.66			Averages 4		
48 Hours	0	0	0	3	5	3	3	3	3
*	Averages 0			Averages 3.66			Averages 3		

*Average number of subdivisions containing barium

throughout the remainder of the investigation, but the feces, while formed, were softer than usual. Only one of the fifteen constipated patients continued to complain of "constipation".

Summary and Conclusions

1. Only one of twenty patients continued to complain of constipation while taking dehydrated prune concentrate 6 grains, methylcellulose 18 grains, and diacetylhydroxyphenylisatin 3/65 grain well diluted with water twice daily.

2. Colonic motility, as roentgenologically observed, was considerably enhanced during the period of study in all of the patients including Case #8. That patient continued to complain of "constipation".

3. Five of these patients were not constipated prior to the onset of this investigation. Three of these five patients were the only ones out of the twenty under observation that developed slight abdominal cramps and diarrhea. These symptoms subsided when two-thirds of the above dose was used.

4. The medication under investigation in the doses mentioned above was clinically and roentgenologically effective in the patients under observation. No untoward side-effects were observed.

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EDITORIAL

Benign Tumors of the Stomach

The diagnosis of benign tumors of the stomach is at times no easy matter. We know that a variety of neoplasms, both benign and malignant occur in the stomach. Benign tumors, such as adenoma, myoma, angioma, lipoma, syphilitic, actinomycotic and infective granulomas are not uncommon. Multiple polyposis similar to polyposis of the colon may also affect the stomach.

These benign neoplasms may be single, multiple, sessile or pedunculated, (rarely projecting from the gastric serosal surface), and as a rule are intragastric and are found in the distal portion of the stomach.

In differentiating gastric from duodenal tumors by the history of bleeding and tarry stools, and long continued digestive disturbances without the orthodox symptoms of gastric ulcer, especially if these symptoms extend over a year or more and the patient is in good physical condition, it is in favor of benign and non-malignant condition. Normal sedimentation rate also favors the nonmalignant state. Gastroscopy and operative procedure will clear up the diagnosis.

On physical examination it is almost impossible to make a definite diagnosis between benign and malignant tumor of the stomach. A benign tumor if palpable is usually smooth and movable, a malignant growth is nodular and fixed. Gastric polyposis may readily be recognized by x-ray examination on account of the mottled or moth-eaten appearance of the barium filled stomach and a normal gastric contour with little or no peristaltic change. If the polyp is single it may appear as an ovoid shadow. Gastric analysis in benign tumors may show little or no change in the quantity and quality of the gastric secretion, while in carcinoma there is a decided change in the gastric chemistry, free hydrochloric aid is diminished or absent except where cancer is secondary to ulcer and the neoplasm is slow in development. As the growth increases the free hydrochloric acid diminishes and lactic acid and Boas-Oppler bacilli appear when the carcinoma involves the pylorus and gastric retention occurs.

When polyposis is associated with pernicious anemia, achlorhydria will be found.

Samuel Weiss

ABSTRACTS

STOMACH

THE PHYSIOLOGICAL MECHANISM FOR DEATH IN MASSIVELY BLEEDING PEPTIC ULCER: H. H. LeVeen, A. G. Mulder, and F. Prokop. Surg. Gynec. & Obst. 94:433-442 (Apr.), 1952.

Massive arterial bleeding from the stomach or duodenum reduces the blood flow through the hepatic artery selectively. A sequence of events is initiated which produces selective hepatic hypoxia. Hepatic hypoxia has been implicated by several investigators as the fundamental cause of surgical shock. Emergency surgery to bring about hemostasis would be the treatment of choice for this type of bleeding.

J. R. Van Dyne

SEQUELAE OF RADICAL RESECTIONS: Clinical and Metabolic Findings in 35 Cases. R. H. F. Brain and F. A. R. Stammers. Lancet 1:1133-1186 (May 26), 1951.

Thirty-five patients were investigated who had total or near total gastrectomies. The sequelae noted were failure of the patient to gain weight and strength and the occurrence of diarrhea, anemia and Vitamin B-complex deficiencies. The authors list the possible causes of the disturbances as due to difficulties of ingestion and defective absorption. The main causes for wasting after radical gastrectomy are poor capacity for food, associated with dumping syndrome, and malabsorption of fat; a high fat diet consisting of 100 to 120 gm. together with a high caloric intake and multiple small meals. Drinking with meals should be avoided. Sugar and protein hydrolysates should also be avoided as they cause a high intrajejunal osmotic pressure. The blood picture, after radical gastrectomy, is usually one of a macrocytosis, and not one of iron deficiency. Vitamin B-complex deficiencies can be prevented by giving large doses of B-complex, nicotinic acid and riboflavin before and after operation.

Joseph Schwab

NONOPERATIVE TREATMENT OF PERFORATED PEPTIC ULCER: S. W. Taylor; and H. L. Egbert. Surg. Gynec. & Obst. 94:464-468 (Apr.), 1952.

It was found that nonoperative treatment in cases of perforated peptic ulcer which had recently been presented as a safe and desirable form of therapy were in many instances misleading. The study here indicates that the operative suture of perforation of the peptic ulcer is not always the decisive factor in whether the patient lives or dies. The important point is closure of the perforation and in many cases this may be spontaneous. Operation may be omitted in those cases in which it is certain sealing-off of the perforation has occurred. Difficulty arises in determining just which patients require operation as a part of therapy. The following recommendations seem justified.

A. All patients seen early with no indication of localization should have immediate operation. The hazard of waiting to see if a perforation will seal spontaneously is greater than the danger of operation.

B. Those patients seen some hours after perforation in whom there is definite evidence that the perforation has been sealed off (good general condition, soft lower abdomen) may safely have gastric aspiration and supported therapy alone.

C. Operative exploration is mandatory if there is doubt as to whether spontaneous sealing has occurred or if the diagnosis is uncertain.

J. R. Van Dyne

INTESTINES

CALCIFICATION OF THE PERITONEUM: A. J. Webster and T. Semple. Brit. M. J. page 1069 (Nov. 3), 1951.

It is very uncommon to find calcification of the peritoneum on radiographic examination.

X-ray of the abdomen shows an appear-

ance not unlike residual barium in the bowel, due to scattered calcified lesions throughout the abdomen.

There is no report of this either in the British or American literature. However, it is recognized on the Continent.

It is supposed to follow tuberculous peritonitis.

The authors think that this lesion is probably more common than the literature would indicate. The reason for this is that the calcified mottling is easily missed on a routine radiograph.

JOSEPH SCHWAB

COMPLEMENT FIXATION TESTS AS AN AID IN THE DIFFERENTIAL DIAGNOSIS OF EXTRAINTESTINAL AMEBIASIS: Sara C. McDearman and Wolcott B. Dunham. Am. J. Trop. Med. & Hyg. 1:182-188 (March), 1952.

Using a commercially available antigen, complement fixation tests for amebic infection were done on the sera of 2,592 patients. The fixation period was 4 hours in the refrigerator. Of the total patients examined, 22 had extraintestinal amebiasis, 187 had intestinal amebiasis only, 2,120 had equivocal or no evidence of amebiasis, and 263 were controls. Of the first group (those with amebiasis, of the liver or lung), a positive result was obtained in 19 (86 per cent). Thirty-two of those with intestinal amebiasis only 15 per cent had a positive test. The remaining 2,383 controls showed a 0.7 per cent incidence of positive findings.

This work further confirms the findings of Hussey and Brown that over 80 per cent of individuals with amebic hepatitis or amebic abscess of the liver may be expected to have a positive amebic complement fixation test, and that there is a comparative lack of sensitivity of the test where infection is limited to the bowel.

The point was not emphasized that many of the varying results to be found in the reports from different workers may be attributable not only to the particular antigen used but also to the length of time of fixation.

KERMIT G. DWORK

TUBERCULOSIS LOCALIZED IN THE VERIFORM APPENDIX: Hyman Morrison; Charles G. Mixter; Monroe J. Schlesinger and William B. Ober. New England Med. 246:329 (Feb. 28), 1952.

Tuberculosis localized in the appendix as the only tuberculous lesion in the body is rare. It is recognized only by pathological examination after appendectomy for supposed acute suppurative appendicitis.

It is not uncommon to find tuberculosis of the appendix when there is tuberculosis elsewhere in the body. This is especially true when the ileocecum is involved.

The incidence of tuberculosis of the appendix computed from the total number of appendectomies reported from general hospitals ranges from 0.1 to 0.3 per cent. It is 24 per cent in tuberculosis sanatoriums.

The authors report 4 cases.

The pathogenesis of this isolated lesion may be as follows: The route of infection may be the blood or lymph stream, by direct extension from adjacent organs and occasionally from infected ingested food such as butter, cheese and milk.

In the 4 cases coincident pyogenic inflammation was found.

JOSEPH SCHWAB

MULTIPLE BALLOON KYMOGRAPH RECORDINGS OF THE EFFECT OF BANTHINE, BELLADONNA AND PLACEBOS ON UPPER INTESTINAL MOTILITY: W. P. Chapman, A. B. French, P. S. Hoffman, C. Jones. New England J. Med. 246:No. 12 (March 20), 1952.

The comparative action of oral Banthine, 100 mg.; tincture of Belladonna, 0.4 and 0.6 c.c., and placebos were studied in 31 healthy adults. The changes in propulsion, total contractions, and tone were determined by a multiple Balloon Kymograph recording method.

Banthine was found to cause a striking decrease in propulsion and total contractions and a slight to moderate decrease in tone.

Banthine acted more rapidly and inhibited motility to a greater degree than did tincture of belladonna in either dosage. Both drugs produced significantly greater effects than were observed after placebo administration. Dryness of the mouth was more noticeable with Banthine than with tincture of Belladonna. Banthine was followed by an increase in heart rate not seen in the tincture of Belladonna tests.

J. R. VAN DYNE

CARCINOMA OF THE RIGHT COLON: Bentley P Colcock. New England J. Med. 246: 391 (March 13), 1952.

Cancer of the right colon should be suspected in any middle-aged person who has persistent right-sided abdominal distress or pain, even though there are no associated gastrointestinal symptoms. It should in any patient who has an unexplained anemia.

The mortality rate is reasonably low. Even the aged withstand resection fairly well.

Local fixation of the growth does not mean a poor prognosis.

A one stage procedure can be carried out with a low mortality rate.

The 5 year survival rate in patients with cancer of the right colon is 50 per cent; it is cut in half when there is microscopic evidence of spread of the growth to the mesenteric nodes.

JOSEPH SCHWAB

ACUTE INTESTINAL OBSTRUCTION IN ELDERLY PATIENTS: W. Cutler. Surg. Gynec. & Obst. 94:481-490 (Apr.), 1952.

It was found that acute intestinal obstruction in patients over sixty was an extremely serious accident, carrying a mortality rate of 57 per cent from all causes, and of 40 per cent from directly related causes. This high mortality was influenced by several factors:

A. Duration of the obstruction. The longer the condition existed, the poorer the chances of recovery.

B. Location of the obstruction. Obstructions involving the small bowels primarily, of whatever nature were more lethal than those of the large bowel.

C. Nature of the obstruction. When due to hernia, adhesions, or foreign bodies, the condition was more severe and abrupt in onset. In proved volvulus, the over all results were worst.

D. Method of treatment. Delay in furnishing relief of the distention with or without the need for appropriate disposition of gangrenous gut, added to the hazard. Prolonged attempts at decompression increased the delay and did not improve the patient's chance of survival. The mortality among patients operated upon within twenty-four hours was 39 per cent as contrasted with 60 per cent in those treated by incubation over 24 hours.

J. R. VAN DYNE

PATHOLOGY AND LABORATORY RESEARCH

PROTEOLYTIC ACTIVITY OF HUMAN GASTRIC MUCOSA: Mitsuhisa Hayakava. Tohoku J. Exper. Med. 53:243 (March), 1951.

In human gastric mucosa besides peptic action, are found cathepsin action and cathepticic pepton splitting action. Casein is also hydrolized at pH 8.5. The author has succeeded also with human gastric mucosa to separate the pepsin action from the cathepsin action, and also the cathopeptonase action from the erepsin action by means of acid and alkaline treatment respectively according to the methods of Utzino and Sakai. In human gastric mucosa halogen-acylase action is found, but carboxypeptidase action or hippuricase action is not found. The hydrolysis of chloracetyldiglycin at pH 7.8 by gastric mucosa from ulcers of the stomach is certain and recognized. Neither acid carboxy-peptidase action nor acid acyldipeptidase action is found yet despite cystein activation. The hydrolysis of diglycin, cloracetyl-l-leucin, cloracethyl-phenylalnin and benzoyl-glycin at pH 4.5 with cystein are all negative.

FRANZ J. LUST

THE ADRENALIN SECRETION OF THE SUPRARENAL GLANDS DURING THE INSULIN HYPOGLYCEMIA IN DOGS ANESTHETIZED WITH EVIPAN-SODIUM: Tatuzi Suzuki and Kazuo Saito. Tohoku J. Exper. Med. 54:No. 4, (Oct. 25), 1951.

It has been shown that the adrenalin secretion rate from the suprarenals in dogs does not materially alter in evipan-sodium narcosis.

In anesthetized animals some authors obtained the negative outcome on the action of insulin upon adrenalin secretion. Stewart and Rogoff collected the suprarenal vein blood of cats under narcosis by means of the cava-pocket method and could not find any definite acceleration of adrenalin secretion after insulin application. Nixon affirmed this result.

It may be added here that in dogs, under avertin narcosis, was observed the definite accelerated adrenalin secretion during insulin hypoglycemia.

Three dogs were anesthetized by evipan-sodium. At first, the right saphenous vein was uncovered under novocain-anesthesia and a small cannula for injection was inserted into it. Evipan-sodium (Bayer) was injected intravenously in doses of 40-50 mg. per Kg. of body weight as a 10 per cent solution. During the operation an additional dose of 15-20 mg. per Kg. of evipan-sodium was given. The left femoral artery was also exposed for recording the blood pressure tracings. Two hours after finishing this operation, the experiment was started. Some minutes before the start of the experiment, evipan-sodium was again injected in a dose of 30-40 mg. per Kg. Evipan-sodium given in such a manner was sufficient to obtain deep narcosis during the whole course of the experiment.

Blood specimens were taken and then insulin (Toronto) was injected intravenously in a dose of 7 units per Kg. of body weight.

The estimation of adrenalin in the collected suprarenal vein blood was carried out by means of the rabbit intestine segment method. The blood sugar content, the arterial blood sugar, the rate of heart beat, the frequency of respiration, body and room temperatures were taken.

It is clearly demonstrated that in dogs anesthetized with evipan-sodium insulin hypoglycemia always acts to accelerate the adrenalin secretion of the suprarenals.

Concerning the blood sugar insulin hypoglycemia in dogs under evipan-sodium narcosis is somewhat severe in comparison with that in non-anesthetized dogs. Nevertheless no visible hypoglycemic symptoms were found in our dogs under evipan-sodium in the course of so severe a hypoglycemia.

SHIGETADA KODAMA

AN ENZYMOLOGICAL STUDY FOR THE GENESIS OF GASTRIC ULCER: Mitsuhisa Hayakawa: Tohoku J. Exper. Med. 53:309 (March), 1951.

Gastric mucosa protein (swine) itself is usually resistant against pepsin action with the exception of so-called mucin. This protein loses its resistance against pepsin after acid treatment with maceration juice of gastric mucosa. Acid treatment with maceration which has previously been made free from its cathepsin action by alkaline treatment gives no influence upon resistance of this protein. The optimal pH values for autolysis of human gastric mucosa are found in 4.5 in the acid and in 8.0 in the alkaline side. These pH values correspond to those of cathepsin and trypsin action respectively, but not to that of pepsin.

The first stage of the enzymological mechanism of the ulcer genesis may be degeneration of the mucosa protein of the locus which is anemic and anaerobe owing to the contraction of small blood vessels. This degeneration may be caused by catheptic enzyme action in the locus. Secondarily the protein there loses its resistance against pepsin or trypsin action, which results in an ulcer by the action of pepsin or trypsin from the mucosal surface.

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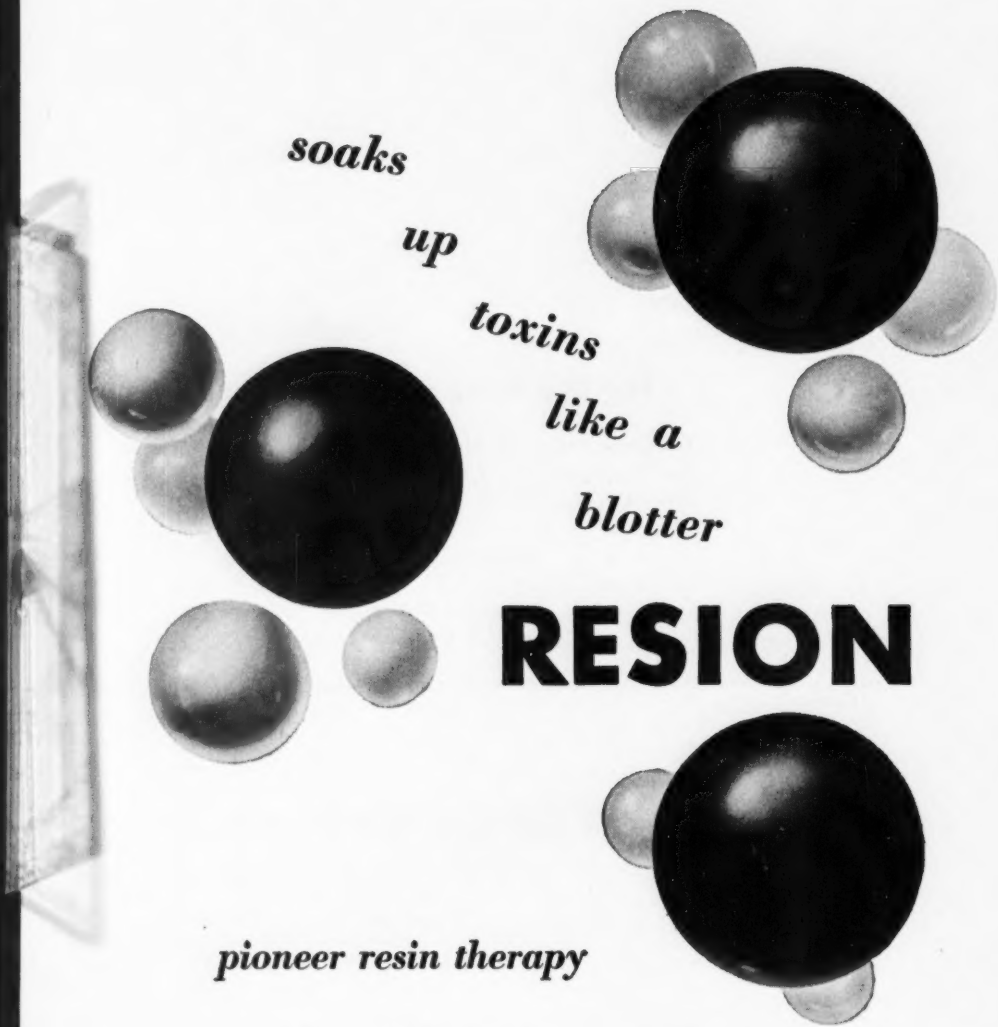

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RESION adsorbs and inhibits the action of many of the products of putrefaction in the intestinal tract and removes substances of endogenous bacterial origin, as toxins.[1,2,5,6]

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Sodium aluminum silicate adsorbs the toxic amines—tyramine, cadaverine, histamine; putrescine, guanidine, also indole and skatole. It inhibits the action of lysozyme.[7]

Magnesium aluminum silicate adsorbs lysozyme,[1,5,6,7] cadaverine and other amines resulting from putrefactive processes.

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1 Rollins, C. T., to be published.
2 Joslin, C. L.: Del. St. Med. J. **25**:35, 1950.
3 Quintos, F. N.: Philippine J. of Med. **26**:155, 1950.
4 Fitzpatrick, V. P.; Hunter, R. E., and Brambel, C. E.: Am. J. Diges. Dis. **18**:340, 1951.
5 Meyer, K.; Prudden, J. F.; Lehman, W. L. and Steinberg, A.: Am. J. Med. **5**:482, 1948.
6 Martin, G. J.: Am. J. Diges. Dis. **18**:16, 1951.
7 Moss, J. N. and Martin, G. J.: Am. J. Diges. Dis. **15**:412, 1948.

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3. be non-habit-forming
4. be non-soporific

} thus permitting the patient to carry out usual daytime activity.

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Calcium bromido-galactogluconate is known as Calcibronat.

PROPERTIES OF SEDATIVES COMPARED

PROPERTY UNDER CONSIDERATION	BARBITURATES	ALKALINE BROMIDES (salts of Na, K & Ammonium)	CALCIBRONAT
Intensity of daytime sedation	Greater than necessary – results in drowsiness	Satisfactory– no drowsiness	Satisfactory– no drowsiness
Habit-forming?	Yes	No	No
Cumulative toxicity	Relatively high	Tendency to bromism	Low
Palatability	Bitter, but can be given in tablet form.	Poor (disagreeable saltiness)	Good (no disagreeable taste)
Gastric toleration	Satisfactory	Poor (alkalinity leads to gastric upset)	Good (no gastric irritation)

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4. It is non-habit-forming and non-toxic.

Reference: ALPERT, B.: Year Book Of General Therapeutics, Chicago, Year Book Publishers, 1940, p. 371.

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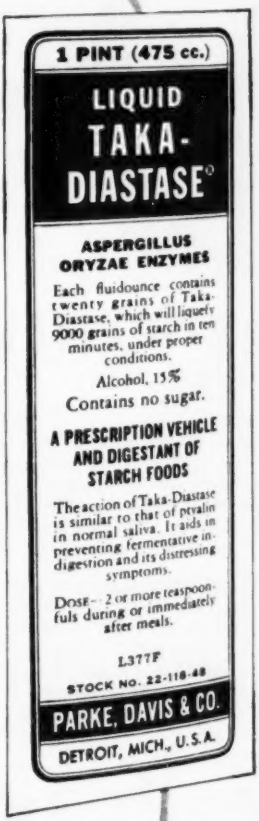
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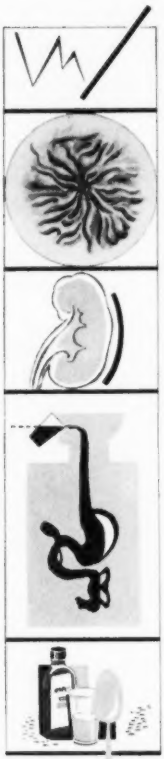

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